um Library

Old Series Vol. VI | CONTINUATION OF THE BULLETIN OF THE NORTHEASTERN BIRD-BANDING ASSOCIATION | New Series Vol. I

BIRD-BANDING

A Journal of Ornithological Investigation

Vol. I October, 1930 No. 4

Chickadee With Colored Celluloid Bands

PUBLISHED FOR
THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
AND
THE INLAND BIRD-BANDING ASSOCIATION

CONTENTS

A Study of the Chickadee and White-breasted Nuthatch by Means of Marked Individuals. Part I: Methods of Marking Birds. By *Dr. Wilbur K. Butts.* 1 Figure. 149

Notes on Protocalliphora During the Summer of 1930. By *Charles W. Johnson* 169

Hours of the Day when Harris's and White-throated Sparrows were Trapped during Migration. By *O. A. Stevens* . . 174

The Technique of Studying Nesting Song Sparrows. By *Margaret M. Nice* 177

Further Banding Notes from Tern Island, Massachusetts. By *Charles B. Floyd* 181

General Notes. A Problem in Catbird Distribution, 185; Three Snow Bunting Returns-W and a Recovery, 187; Brewer's Blackbird: First Nesting and Banding Record in Illinois, 188; A Danvers, Massachusetts, Chipping Sparrow Recovered in Iowa, 188; Westfield, Massachusetts, Tree Sparrow Returns-W, 188; Returns of Banded Ducks Liberated Outside their Migration Route, 189; A Pine Warbler Return, 190; Yellow Warbler and Redstart Returns in Wolfville, Nova Scotia, 190; Examine Birds Killed by Automobiles, 190; More Data on "How Long do Purple Finches Live?", 190; Wood Thrush Returns, 191; Purple Martin and Chimney Swift Returns, 191; Additional Bird Weights, 192; To Members of the Northeastern Bird-Banding Association, 194.

Recent Literature. Der Vogelzug, Vol. I, No. 3, July, 1930, 194, British Birds, Volume XXII, June, 1929, to May, 1930, 195; The Wilson Bulletin, Volume XLII, No. 1, 196.

BIRD - BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. I OCTOBER, 1930 No. 4

A STUDY OF THE CHICKADEE AND WHITE-BREASTED NUTHATCH BY MEANS OF MARKED INDIVIDUALS[1]

PART I: *Methods of Marking Birds*

By WILBUR K. BUTTS, PH.D.

A THESIS PRESENTED TO THE FACULTY OF THE GRADUATE SCHOOL, CORNELL UNIVERSITY, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

INTRODUCTION

ORNITHOLOGISTS have long recognized the need of being able to distinguish individual birds in solving ornithological problems. Bird-banding was devised as a method of filling this need. With the usual bird-banding methods, however, the bird must be taken in the hand in order to identify the individual. Could we not learn much more about birds if we marked individuals so that they could be recognized wherever seen without recapturing them? The present research was undertaken with the view of investigating the possibilities of this method of study by applying it to two common birds, the Chickadee and the white-breasted Nuthatch. The birds were marked in two ways—by staining the feathers and by means of colored bands.

Aluminum bands as a means of tagging birds have been extensively used in the United States and Canada during the past eleven years since the Biological Survey took over this work, and to a less extent for ten years before by members of the American Bird-Banding Association. Chickadees and Nuthatches have long been favorites with bird-banders in

[1] The author is indebted to Dr. A. A. Allen, of the Department of Ornithology, Cornell University, for helpful suggestions, assistance in field work, and critical reading of the manuscript; to Frederick Garrett, Edwin Webster, R. E. Crouch, and A. E. Brower for assistance in field work and in banding birds. The author wishes to express his appreciation also to the correspondents who have supplied information.

many sections because of the ease with which they may be trapped in the winter. Consequently many have been banded.[1] The amount of definite information gathered, however, has not been large. If one reads the list of "problems that can be solved by bird-banding operations" mentioned in the circular "Instructions for Banding Birds" (Lincoln, 1924), it can readily be seen that in case of most small land birds, the results achieved have fallen far short of the objectives. Of course bird-banding is still in its infancy, but can we not increase the amount of significant data obtained without any increase in the extent of bird-banding operations?

If birds are marked so that individuals can be recognized at sight, there are a number of advantages over ordinary bird-banding methods. In the first place, when a bird has once been marked, its movements can often be traced even when it does not visit a trapping station again. Very often a bird will visit a trapping station but once, when it is perhaps somewhat outside its usual feeding-range. Therefore with the usual banding methods we cannot be sure whether an individual which does not repeat has left the vicinity or not. If the bird can be recognized wherever seen, however, a search may still reveal its presence. Marked birds which return after a migration to the same region but not sufficiently near the banding station to be recaptured can likewise be detected.

Some species of birds, such as Grackles, become trap-shy, and are not easily caught after once being banded. Other birds can scarcely be captured at all as adults, although the young can easily be tagged. Banding birds which are never retaken is valueless if the birds cannot be recognized at sight, except in the comparatively rare instances when the bird is found dead. Marking birds so that sight identification is possible, however, makes tagging of trap-shy birds as profitable as banding those which are easily caught. Marking nestlings in this way should help to solve the perplexing problem of what becomes of the young birds after leaving the nest.

In making life-history studies it is often important to be able to recognize an individual at some particular moment. For example, suppose one is studying the activities of a pair of Chickadees, a species in which the male and female are alike. Another bird trespasses on the territory of the pair under observation. One of the pair drives the intruder away.

[1] 5887 Chickadees and 1537 White-breasted Nuthatches were banded prior to July 1, 1929

Was it the male or the female which did the fighting? Again it may be desirable to know whether both sexes incubate, whether the female ever sings, and which sex feeds the young the more frequently. Of course, even with the usual banding methods the male may be banded on the right tarsus and female on the left, but the possibilities along this line are limited to distinguishing only two birds. It is much more satisfactory to mark the birds with colors.

The amount of data which can be collected by marking individuals may be increased through the activities of other observers. In any neighborhood there are usually some people interested in birds who are glad to watch for and make reports on marked birds, although they may not have sufficient time and knowledge to become bird-banders themselves. The use of colored bands or stains also saves the time of the bird-bander. What bird-bander has not had the experience of trapping birds for several hours or even days and getting nothing but repeats? Of course, the recording of repeats is important, but there is little point in catching the same bird day after day or several times in the same day. It is much easier to note the presence of a bird distinguished by colored bands, than it is to retrap the bird to learn its identity: one can concentrate on trapping new birds, let the old ones go in and out of the traps as they please and yet at the same time record their presence. When all the birds coming to the station have been banded with colored bands, the operator can cease banding until new birds begin coming to the traps. For some species it would thus only be necessary to trap a few times a year and yet keep an accurate record of the birds visiting the station. The rest of the operator's time can be spent in the field, making observations and following the birds' movements. The behavior of birds which are not continually trapped is also much more natural.

The ability of the operator to let banded birds go in and out of the trap, and only spring it on unbanded birds is especially important in case of Chickadees. These birds usually visit the feeding station in small flocks of ten or a dozen individuals. After trapping a few times the operator finds he has most of the birds banded, but some never seem to get caught. Others already banded, perhaps bolder birds, usually go into the trap first. Then, before all the birds are caught the flock leaves, frightened away by the trapping. It is much easier to catch all the birds in a flock if only unbanded birds are trapped. Of course, even if uncolored bands are used, one can usually see with a pair of field-glasses whether a bird is

banded or not and allow the banded ones to pass in and out, but the individuals visiting the station could not then be determined, and important records might be lost. Chickadees also tend to become trap-shy after being caught a few times, so that it soon becomes difficult with ordinary bands to determine what individuals are present. They may cease to visit a trapping station if some one else nearby is simply running a feeding station. On the other hand, if trapped but once and marked with colored bands, the birds become tame, some individuals readily learning to eat out of the hand.

The marking of individuals also facilitates experiments in avian psychology, a field which has scarcely been touched.

It is readily apparent that this kind of banding vastly increases the amount of data which can be collected in a given time as well as considerably extending the field of bird-banding. In order that birds may be identified if captured by other workers in another part of the country, the Biological Survey bands should be applied along with the colored ones. If the feathers are stained, the bird should also be banded.

As an example of an extensive investigation carried on by means of marked individuals, we may cite the work of J. P. Burkitt (1924) on the English Robin. Burkitt did not mark the birds with colors, but used "rings" made of aluminum and "some dark tinny material." He says: "As to rings, I have up to now used variations of numbers up to three on a leg or up to four between both legs. To form the latter variations one of the rings had to be black and somewhat longer and narrower than the aluminum ones in order to be more easily detected. . . . I gave up my first idea of coloured rings as quite too difficult of detection. I may warn others that it often takes much patience to get a clear steady view or proper background for identifying the rings." Burkitt carried on his studies over a period of several years, and was able to get important information regarding matings, territories, local movements, and length of life of the Robin. My own experience bears out Burkitt's statement that it requires much patience to identify the bands, but I have come to the conclusion that colored bands are quite practical; indeed, light or medium-colored bands are much more easily detected than are dark ones.

STAINING THE FEATHERS

Staining the feathers as a means of marking birds has often been attempted. In general the results have not been satisfactory, because the colors tend to fade in a short time. Dr. J. B. Watson, however, successfully used this method in

marking the Noddy and the Sooty Tern in his studies of homing and nesting activities of these birds on the Florida Keys. (Watson and Lashley, 1915.) In a former paper (Butts, 1927) was included a preliminary report of the experimental work on the use of stains which had been carried on at Cornell University.

There are two types of substances, dyes and paints, which can be used to color feathers. In the former the color is in solution and actually penetrates the object stained. In paints the coloring agent or pigment is suspended or dissolved in some adhesive substance which makes it adhere to the object painted. Pigments are in general more permanent than dyes. In order to test the permanence of the various coloring agents, they were applied with a brush to feathers of the domestic fowl. The feathers were then exposed to sunlight, wind, and rain for several weeks. The more permanent colors were also tried on living birds.

Dyes. In the earlier experiments at Cornell the following dyes or stains were tested: iodine, picric acid, indigo, carmine, congo red, methyl blue, methyl green, Hoffman's green, orange G, saffranin, gentian violet, indanthrene blue B, anthraflavone G C, thio indigo red B, indanthrene golden orange G, pontamine yellow, pontamine red, acid fuchsin, and basic fuchsin. Alcohol was used as a solvent for all dyes which would dissolve in it. If insoluble in alcohol, water was used, and the feathers were first washed with ether, alcohol, or carbon tetrachloride.

Some of these dyes are quite light-fast. The more permanent ones, however, will not penetrate the feathers. Such are insoluble in alcohol and impracticable because they must be used in aqueous solutions in which the object to be dyed must be boiled, and since the feathers are somewhat oily, aqueous solutions will not penetrate. The color merely adheres to the outside and soon wears or washes off. Previous washing of the feathers in ether or alcohol does no good. Some of the alcohol-soluble dyes do penetrate the feather so that the colors will not wash out. These dyes, however, are not light-fast. Fuchsin seemed to be the dye which penetrated best, and it was tried on living birds. The color did not last for more than three weeks, and often it had become quite faint in one week.

The following dyes also proved unsatisfactory: Fast Light Yellow 3 G, Chrysodine Y Extra Conc., Magenta Extra Conc., Methylene Blue Extra Conc., Victoria Green Conc., National Alphazurine, National Acid Green L Extra, National Croceine

Orange Y Conc., National Fast Red S Conc., National Wool Yellow Extra Conc.

Dr. Rudolph Drost experimented with dyes for coloring birds in Germany, and claims to have found a method of staining which produces colors that will last for several months. He kindly sent me this information, but he requested that complete directions should not be published for fear that inexperienced persons might use the stains and cause injury to the birds. Certain solvents which take up the oil in the feather and allow the dye to penetrate are added to the dyes. These solvents have a cooling and anesthetic effect and would injure the bird if used too freely. The dyes he used are Fuchsin, Diamangirün, and Victoria Blau. Strange to say, Fuchsin is also the dye which I had found most satisfactory to produce a red stain, although the color never lasted more than two or three weeks. The solvents used by Dr. Drost I added to the Fuchsin. The stain, however, when tried both on test feathers and on living birds, proved but little more permanent than before, the color fading within two weeks. When used with some dyes the solvent appeared to increase the permanence slightly, while with others it had no effect. It cannot be used with dyes which are insoluble in alcohol. To test the Fuchsin I was using, I sent for some to the same manufacturer in Germany who had supplied Dr. Drost. Samples of Diamantgiün and Victoria Blau were also obtained. Results with these German dyes were no better than with similar ones made in this country.

Paints. The pigments used in a good grade of paint or enamel are more permanent than dyes, and they will not fade when exposed to sunlight. However, when a paint is used on feathers, the adhesive substance will cause them to mat together, thus bringing about possible injury to the bird. Of course, the paint can be thinned with some substance like gasoline or carbon tetrachloride which does not become sticky on drying, but if thinned sufficiently to prevent the feathers matting together, there will not be sufficient adhesive material to make the pigment adhere. Even if not thinned the pigment wears off after a time.

Among the substances of this class which I have tried are waterproof drawing ink in several colors, several kinds of enamel, and artists' oil paint. Waterproof drawing ink loses its color in a few days. The fading is due to wear and to the action of sunlight. The same is true of the enamel used to color electric-light bulbs.

"Duco," "Valentines Brushing Lacquer," and similar

enamels are more permanent. When applied to test feathers and exposed to sunlight and rain for several months they did not fade greatly. Cheaper grades of enamel, however, lost their color. Even the best kinds when applied to the breast or wings of Chickadees, Nuthatches, and Song Sparrows wore off within a short time, usually within two weeks. They were tried thinned with alcohol, mixed with anilene dyes, and without thinning. When used unthinned on the Chickadee, a bird whose plumage is light and fluffy, the enamel matted the feathers together considerably. Consequently it was applied sparingly on a limited area. On Sparrows, birds with more compact and firm plumage, the enamel did not greatly disarrange the feathers. About a dozen House Sparrows were thoroughly painted with unthinned lacquer, and kept overnight to determine what effect the painting would have. They seemed to be not at all injured. The birds were then released. Unfortunately the permanence of the color was not determined, since none of them were seen again. They were supplied with colored bands to make identification possible in case the enamel wore off.

When artists' oil paints were used the results were similar to those when enamel was used. They were unsatisfactory on Chickadees and Sparrows. When applied to the back of the Downy Woodpecker, however, the color was quite permanent. A Downy Woodpecker painted red on the back on March 5th still had the color bright on April 25th. On May 18th, about ten weeks after being painted, the color was still distinguishable, although rather faint. Artists' oil paint was the material found most satisfactory by Dr. J. B. Watson[1] for marking Terns in his studies of these birds on the Florida Keys. The paint was smeared on the plumage with the grain of the feathers. After six weeks the colors were still bright. A variety of colors and types of marking, such as stripes and bars, were used, so that many birds could be marked differently.

Effect of the Colors on Behavior of the Birds. After being painted or dyed the birds naturally try to remove the material by preening the feathers. As far as my experience goes, after the plumage becomes dry they do not pay any more attention to it, nor do other birds appear to notice the color. According to Watson, however, (1908) when a Noddy or a Sooty Tern was painted, the bird was at first not recognized by its mate.

[1] *Ex litteris.*

It would be driven away from the nest as if it were a strange bird. Other birds often joined in the affray. It would usually persist in returning to the nest, however, until finally it was accepted, and allowed to go about its household duties as usual. On one occasion I watched a pair of Nuthatches after the male had been painted. The male was preening his feathers. The female approached and appeared to examine him closely. Then she flew some distance away. Presently the male flew off in the direction his mate had taken. I followed him for about three hundred yards without seeing anything of the female. The next day the pair were together again. There is no evidence of any birds having been permanently injured by either paints or dyes.

Usefulness of Marking Birds by Staining the Feathers. There is one great advantage in this method of marking the birds. The marked individuals are very conspicuous. It gives one a distinct shock to see a "blue-breasted" Chickadee, or a Downy Woodpecker with a red stripe down its back instead of a white one. People seeing such strangely colored birds, and thinking that they are new species or freaks of some sort, are likely to report them. Thus a considerable amount of data on the movements of birds can be collected. On a number of occasions during the experiments at Cornell, people called the Ornithology Department on the telephone to report a "new kind of bird" that they had seen in the neighborhood.

It has been suggested that paints or dyes could be used as an aid in the study of migration. If the birds were trapped and colored in large numbers at some point in their migration route like Louisiana, no doubt many of the marked individuals would be reported from various points to the northward. Thus much data regarding the rate of migration and the routes traversed could be obtained. In studies of this sort it would be necessary, of course, that each species of bird be painted at only one locality, unless the different operators coöperated and used different colors or a different type of marking.

Unfortunately, while artists' oil colors are satisfactory for some birds, the experiments indicate that the application of paints or dyes to small land birds in general cannot be recommended at present. Professor W. D. Bancroft of the Department of Chemistry, Cornell, believes that a stain suitable for coloring birds can be found, although the problem is a difficult one. Attempts to develop a new dye would have a better chance of success than trying to find a satisfactory one among the innumerable already known substances. The problem,

however, is one for the chemist rather than the ornithologist. The ideal substance would probably be a dye rather than a paint since the latter class of substances tends to mat the feathers together and to wear off.

In the present investigation of the Chickadee and Nuthatch, main dependence was placed on colored bands. The birds were stained principally for the purpose of testing the permanence of the colors.

ENAMELLED BANDS

Colored bands of two kinds, enamelled aluminum bands and celluloid bands, were used in the present investigation.

Mr. C. L. Whittle, of the Northeastern Bird-Banding Association, (1925) seems to be the first to have used colored aluminum bands. Using the numbered bands furnished by the Biological Survey, he at first colored them experimentally with diamond dyes and then applied a coat of varnish. The color, however, wore off within a month. Using Pyraline enamel, a product manufactured by the Dupont Company, Whittle has had much better success. He was able to identify Catbirds at sight after they had worn the bands for two years.[1]

In the July 1927 issue of the *Bulletin of the Northeastern Bird-Banding Association*, an advertisement appeared stating that Mr. A. W. Higgins would supply enamel for coloring bands or would color bands sent to him.

In the fall of 1927 Mr. Whittle kindly colored a dozen bands for me, and I used them on Chickadees and Nuthatches. Two Chickadees and two Nuthatches were retaken a year later. By this time the enamel had partly worn off, but it was still possible to identify the birds, although not with any degree of certainty, since when the worn part of the band was turned toward the observer no color was visible. Mrs. H. C. Dunham, of Wellesley, Massachusetts, used colored bands enamelled with Duco but found that the color was not permanent, although sometimes visible the second season.[2]

In order to make a more thorough test of enamelled bands, I attempted to obtain some Pyraline from the manufacturer, who advised the use of Duco as better than Pyraline. The company also recommended that the bands be cleaned in a warm solution of zinc sulphate in order to remove the greasy residue on the aluminum before applying the enamel. This

[1] *Ex litteris*. See also Whittle, 1926a b, c; 1927a.

[2] *Ex litteris*.

seems to make the color adhere better, but I have no records to show how permanent the colors are. The application of the enamel does not interfere with the reading of the numbers, providing it is not put on too thickly.

Whittle sometimes uses two colors on the same band, painting the upper half one color, the lower half another, thus greatly increasing the number of birds which can be marked differently. (Whittle, 1926b.) The size of the area colored is then quite small when small sizes of bands are used, but he writes that the colors can be readily distinguished if a close approach to the bird is possible, as is the case at a feeding station. Dr. Francis Harper has shown that it is even possible under certain conditions to read the number on an aluminum band on a bird without capturing it. (Whittle, 1928.) This was done at a window-shelf feeding station.

Undoubtedly colored enamelled bands, if properly prepared, are of great value for marking birds which come to a feeding station. If the color wears off after a season, a new band can be applied. Enamelled bands are easier to prepare than celluloid ones, but even at their best they are not as conspicuous as the celluloid. Accordingly, for an extensive study, when it is desired to identify the individual birds wherever seen, celluloid bands are much more satisfactory.

CELLULOID BANDS

Celluloid has long been used as a material for the manufacture of poultry bands. The first record of its use on wild birds is that of Mr. L. Gain (1912), who marked a number of Penguins in the Antarctic with celluloid rings in February, 1907. In October and November, on return of the birds, a score of the banded individuals were seen. It was later reported that some whalers recovered a number as late as 1910. This indicates that celluloid bands are not injured by salt water.

A number of other people have applied celluloid bands to wild birds, though apparently not extensively. In 1914 Mr. W. C. Lyon[1] placed about 25 "baby-chick" red celluloid bands on Bronzed Grackles. The next year a Grackle wearing a red band was reported by a neighbor.

Mr. S. Prentiss Baldwin[2] used celluloid bands for marking House Wrens so that the sexes could be distinguished. The

[1] *Ex litteris.*
[2] *Ibid.*

practice was discontinued when it was found that the sex could be distinguished at sight without the use of bands.

A Barn Swallow wearing a red celluloid band with the number 16 was found dead near Victoria, British Columbia, in 1927. The bander is unknown. (Lloyd, 1927.)

Celluloid poultry bands are made in two styles—"spiralets" made of celluloid wire wound into the form of a spiral, and "bandettes" made of sheet celluloid. The latter are superior from the standpoint of greater visibility and because numbers can be painted on them. They can be obtained from dealers in poultry bands (see advertisements in any poultry magazine) in sizes from one-fourth inch inside diameter up to one inch. The smallest-size bands are known as "baby chick" bands and are the same size as number 4 U. S. Biological Survey aluminum bands which are suitable for birds the size of the Grackle and the Blue Jay. They are made in fourteen different colors.

Some dealers also supply celluloid "canary bands," which can be used on smaller birds. These are about 3 mm. inside diameter and 3 mm. wide. The ends of these bands do not overlap, but turn outward, so that it would seem that they would rather easily come off the bird's tarsus. I tried them on Sparrows, Downy Woodpeckers, Nuthatches, and Chickadees, and found them satisfactory except in case of the Chickadee. This bird always begins a valiant struggle to remove the bands immediately after being released, the struggle sometimes lasting for fifteen or twenty minutes. In a number of cases the bird succeeded in removing the canary bands. Because of the uncertainty of the canary bands staying on for any length of time, it seems better to make one's own bands for use on small birds. The bands can be made much wider than are the canary bands, so that they will be more conspicuous.

Sources of the Celluloid. Celluloid may be procured from the Celluloid Corporation, 290 Ferry St., Newark, N. J.; or from the DuPont Viscalloid Co., 10 W. 33rd St., New York City. The cost is about $1.20 for a sheet 20 in. by 50 in. The thickness of the material for small size bands (Nos. 1 and 1A) should be 10/1000 of an inch. If too thick, there is difficulty in making and in applying to the bird's tarsus. If too thin, the band is apt to come off. Celluloid of the proper thickness can also be obtained from baby-rattles and other toys purchased at ten-cent stores. One can also make small bands by using the material in the larger poultry bands.

Method of Making. The celluloid should first be cut into

appropriate pieces. To make bands for birds the size of a sparrow or smaller, the pieces should be 5 mm. by 13 mm. These will make bands about 2½ mm. inside diameter and 5 mm. wide with the ends overlapping between 3 and 4 mm. The celluloid which is used in baby-rattles usually shrinks on being heated. Accordingly allowance for shrinkage must be made, the pieces being cut 6 by 14½ mm. The celluloid purchased in sheets does not shrink. If only one band is applied to a tarsus, the bands may be made more than 5 mm. wide. A width of 8 or 10 mm. is desirable since wide bands are more conspicuous. Bands for larger birds may of course be made still wider. An overlapping of the ends of 3 to 4 mm. is about right when celluloid of the correct thickness is used, but if the celluloid is rather thick, the overlap should be less, or else there will be difficulty in making the bands and in applying them to the birds' legs. If the celluloid is quite thin the ends should overlap more, so that the band will not come off. Bands of larger size should also overlap more.

The piece of celluloid cut to the proper size is then held by the ends between the tips of a pair of forceps, dipped in boiling water, and bent into a U shape. After removal from the water the celluloid will retain the shape into which it has been bent. It may then be wrapped with the fingers around a nail. The diameter of the nail should be the same as the inside diameter of the band which it is desired to make—*i.e.*, 2½ mm. for No. 1 bands. The band is then held in place on the nail by means of a metal band sufficiently large to slip over the celluloid one. Standard aluminum bird-bands may be used for this purpose, using the next larger size than the bands you are making, but it is necessary to open them slightly to slip them over the celluloid, and then pinch them together again to hold the celluloid in place. This opening and closing destroys them after a few bands have been made, so that it is better to make a special metal band for this purpose out of tin or aluminum. After the celluloid is thus held in the desired shape on the nail it is dipped in boiling water again. Prolonged immersion does not injure it, and it should be left in the water for several seconds. Celluloid which shrinks, however, should be left in the boiling water only a second or two. However, it should be left in as long as possible, because bands which are insufficiently heated have a tendency to expand after a time, so that they become loose on the bird's tarsus and may even come off. For this reason also the water must be actually boiling.

On removal from the boiling water the nail, with the band

still on, is dipped in cold water. The band may then be removed and is ready for use. After a little practice, between thirty and forty bands can be made in an hour. No doubt, after a little experimentation one could devise a more efficient method of making them.

Applying the Bands. Since it is difficult to open the band and put it on the bird's tarsus with one hand, while one is holding the bird with the other hand, some kind of an instrument for holding the band open is desirable. A short stick with a square end, 3 mm. wide, may be used. Before taking the bird in the hand, the band is opened and placed on the end of the stick, in such a way that the end of the stick holds the band open. The bird is then taken up and the band slipped off the stick onto the bird's leg.

A much better tool can be made from a small pair of scissors and two needles. The needles are soldered to the ends of the scissors, extending about half an inch beyond the tips, with the needle-points toward the base. To use this instrument, merely thrust the needles inside the band. Opening the scissors then opens the band. In order to prevent the band slipping off the end of the needles, their tips should be bent outward slightly The ends of the needles must be heated red hot to destroy the temper, before they can be bent.

After being put in position on the bird's tarsus, the band should spring shut of itself, but it may be necessary to adjust it by pinching it together slightly.

Colors. Very light or dark colors should not be used, as they are difficult to distinguish at a distance. Pink, scarlet, or medium red, medium blue, green, and yellow are the most satisfactory. White should not be used, as it is not easily distinguished from aluminum. The same is true to a lesser extent of light blue, though if the band is made wide enough it is satisfactory. Violet can be used, but it is not easily seen at a distance. Orange would probably be a good color, but it is difficult to procure. The colors are apt to fade somewhat after a time. Accordingly, close shades of the same colors should not be used. Pale shades become almost white after fading. However, no difficulty was experienced in this respect when good strong colors were used, even after the bands had been on the birds for over a year.

White celluloid may be painted various colors by using a quick-drying enamel or lacquer such as "Duco," but the color wears off in time, so that the use of painted bands might cause confusion if observations are carried on for more than one

season. The celluloid must be thoroughly cleaned before being painted.

Number of Individuals Which Can Be Marked. A numbered aluminum band should preferably be placed on each bird in addition to the celluloid one. Then, using only one color, six birds can each be marked differently and are identifiable, thus: (1) aluminum on left tarsus, celluloid on the right; (2) aluminum on the right leg, celluloid on the left; (3) aluminum and celluloid both on the right, the aluminum above the celluloid; (4) same as the last but with the aluminum below the celluloid; (5) aluminum and celluloid both on the left, the aluminum above; (6) same as the last but with the aluminum below. If one aluminum and two celluloid bands of the same color are placed on one bird, but with not more than two bands on the same tarsus, six additional birds can be marked. If two colors are used, either singly or in combination, a total of thirty-six birds can be banded, each one differently. With five colors (pink, red, blue, green, and yellow) the number is one hundred and eighty.

If necessary, in order to increase the number of birds which can be marked differently, striped bands may be used. By using several colors of enamel and several colors of celluloid, a great many combinations are possible. If the bands are coated with clear lacquer after being painted, the stripes will be rendered more permanent. Both horizontal and spiral stripes can be used, although there is some difficulty in distinguishing one from the other in the field, particularly if the stripes become partly worn off. Accordingly it is not recommended to use both kinds of stripes unless the large number of birds to be marked renders it necessary. Vertical stripes would probably not be satisfactory because if the stripes were made wide the band might appear as one solid color from one angle and as another color from another angle, while if the stripes were narrow they would blend together at a distance. The stripes on horizontally or spirally striped bands should be 2 mm. or more in width to prevent blending. Another way to increase the number of birds which can be marked is to use bands of two widths. Bands 5 mm. wide can readily be distinguished from those 10 mm. wide.

Burkitt while studying the English Robin used as many as three bands on one tarsus, and four bands on one bird. While the use of four bands might be practicable in case of moderate-sized birds, it would probably not be wise to use more than three on small birds like the Chickadee. Chickadees seem to be able to carry three bands easily enough, but four might

overload them. Even if they were not injured by a load of four bands, the difficulties in observation would be greatly increased.

The more intricate the marking scheme, the more difficult it is to identify the birds. When only one colored band is used, recognition under favorable conditions is quite easy from a distance of fifty or sixty feet. When two are used on one individual, observation is more difficult, and one has to await a favorable opportunity when both bands are visible in order to make the identification. If three were to be used, the difficulty in observing and remembering the positions of the different bands would in most instances be so great that the scheme would likely be impracticable. One should keep the marking plan as simple as possible, using more than one colored band, striped bands, and bands of different widths only when necessary.

Method of Keeping Records. Needless to say, the marking of a large number of birds necessitates the keeping of careful and extensive records. In order that no two birds might be banded alike, I first made a list of all the possible ways in which the birds could be banded, using one aluminum and one or two colored bands on each bird. The different colors were listed on separate pages. This list was then carried with me into the field, and whenever a bird was to be banded, the list was referred to, in order to determine what bands to apply and their position on the bird's tarsi. After banding, the number of the aluminum band used was then entered in the list opposite the particular combination used. This list then served two purposes: it showed what combinations had already been used, and, when a bird wearing colored bands was seen in the field, it indicated the aluminum band number of that bird. In addition to this list a card index was kept of all the birds banded. On the cards were written a record of the band number, the band combination, the date and place of banding, and the date and place of each occasion that the bird was seen.

It is much easier to ascertain what colors a particular banded bird is wearing than it is to determine the exact position of the bands. For example, one may catch a glimpse of a bird and notice that it wears a red band but be unable to determine whether the band is on the left or the right tarsus. Therefore I used one color or combination of colors at one station and a different color or combination of colors at another station. Thus, at the station on the north side of Fuertes Bird Sanctuary pink and yellow bands were used; on the east side, pink and red; and on the south, pink and green. Then if a bird with a

green band was seen on the north side, I knew that it had come from the south side even though I could not determine exactly which individual it was. If a bird with a blue band was seen at the Sanctuary, it must have come from some station outside of this area. In this way a considerable quantity of data was collected without actually identifying individual birds

Limitations and Difficulties in Use of Colored Bands. Obviously, colored bands cannot be used successfully on all species of birds. Some species keep to the tree-tops so that the bands cannot readily be seen. With others, like the Swallows, the legs are seldom visible. Still others are so shy that they do not permit a close approach. Of the birds studied I found that identification was most easily effected in case of the Chickadee and the Song Sparrow. Nuthatches and Woodpeckers were not especially difficult, although it was not so easy to see the bands, and they often stayed in the tops of the trees for some time. On several occasions it was necessary to watch a Nuthatch for fifteen or twenty minutes before an opportunity was afforded to see the bands clearly. It should not be supposed that one can identify every banded bird that is seen. Very often the bird flies away before the color and position of the bands can be ascertained. A great deal of care and patience are necessary, and a favorable opportunity for observation must be awaited. The bird should not be between the observer and the sun nor high in a tree with the sky as a background. I found that with experience, greater proficiency in determining the color-combinations was gained. At first it was somewhat difficult to decide quickly whether a band was on the right or the left leg, but after a few weeks' experience there was but little difficulty in this respect. In order to avoid mistakes, an effort was made to make two determinations of the color-combination on each bird seen. Identifications based on a single observation were usually recorded as doubtful. Because of the difficulty in making accurate determinations, observations by people who were inexperienced or who were not familiar with the colors used were also considered as doubtful.

With a good pair of field-glasses under favorable conditions identification is possible at a distance of sixty feet or more. For satisfactory work, however, the observer should be within thirty feet of the birds. There is no advantage in getting closer than fifteen feet except when the observer is not provided with a pair of field-glasses. These distances refer to identifying individual Chickadees. Larger birds with larger bands can be identified at greater distances.

Some difficulty was experienced because a few of the bands expanded after being worn by the birds for some time. If there are two bands on the same leg, and one of them expands, it will slip over the other one. In some cases also the bands came off. The stretching of the bands was probably caused by insufficient heating in manufacture, and perhaps also by being opened too widely while being applied to the tarsus. If desired, the bands can be sealed with celluloid cement. DuPont's Household Cement is satisfactory for this purpose.

Retrapping the birds is sometimes necessary whenever it is suspected that a band has come off, or when an error in banding has been made. Retrapping of birds the second season is also advisable. If a number of persons are using colored bands on the same species, frequent retrapping to be certain that the birds seen were not banded by another operator, would be necessary. If more than one operator in a locality marks the same species of bird with either stains or colored bands, only confusion can result unless the operators coöperate and use different colors. Any one contemplating such a study should communicate his intention to the United States Bureau of Biological Survey.

It would probably be best to restrict the use of celluloid bands to operators who are making earnest studies of particular species of birds. Indiscriminate use of celluloid bands by operators who have no definite object in view would serve no good purpose.

The marking of birds by colored bands is of most use in making local studies. The likelihood of the colored bands being seen on birds during migration is small.

SUMMARY OF TRAPPING OPERATIONS

The study of the Chickadee and the Nuthatch was first begun in the fall of 1924 and continued until June, 1925. A considerable amount of data was collected at that time regarding the local movements of Nuthatches, but practically nothing was learned regarding the Chickadee. Seven Nuthatches and fourteen Chickadees were banded. An account of this preliminary work was published in the *Auk* (Butts, 1927).

Work was commenced again in the fall of 1927, and continued, except for two months during the summer of 1928, until July, 1929. During the season 1927-28, 61 Chickadees and 19 Nuthatches were banded. None of the birds banded in 1924-25 were recaptured, although a Chickadee banded in

April, 1926, and two Nuthatches banded in 1926 and 1927 by other operators were taken.

The most important part of the work was done in 1928 and 1929. During this season 184 Chickadees and 37 Nuthatches were captured. Some of these were banded by other operators, but all were taken in the vicinity of the area where the birds were studied. Of these 15 Chickadees and 9 Nuthatches were returns from previous years. The increase in number of birds banded was due to improved trapping methods, maintenance of a larger number of feeding stations, and assistance from other workers. Trapping was carried on at twenty different substations.

At least fifteen persons living within the area where the birds were studied maintained feeding stations. Some of these served as points to watch for the birds in order to determine their movements. In general, however, these extra feeding stations were a hindrance rather than a help, since they attracted the birds away from the regular trapping stations. Much time was lost in waiting at one place, while the birds were feeding at another.

Food, consisting of suet, sunflower seed, and occasionally peanuts, was provided at all times. Peanuts were easily the favorite food with both Chickadees and Nuthatches. The birds would visit stations where peanuts were provided, and neglect other nearby stations. Sunflower seeds were preferred to suet.

At the principal stations food was put out in the latter part of September, and replenished at intervals until the latter part of April. After nearly all the birds had been banded at these stations, others were started. Owing to the abundance of natural food during the fall, the feeding stations were but little visited until late in November. Accordingly, but few birds were trapped before December 1st. At this season the birds paid little attention to suet, and it was very difficult to keep out a supply of sunflower seed. No matter how much was put out one day, it would all be gone the next, having been carried away by mice during the night. An attempt was made to trap the mice, but after catching twelve at one place without overcoming the difficulty, this was given up. Finally, at some of the stations the food was placed on a board nailed to the top of a pole driven in the ground. The underside of the board was covered with tin, so that mice could not reach the top. This device, when erected far enough from trees and shrubs, also prevented squirrels and chipmunks from carrying away the food.

The traps used were small wire cages about 12 inches long, 8 inches high, and 8 inches wide. These traps are set off automatically when a bird steps on a platform inside the trap. They could easily be transported, and set up anywhere in a moment by placing them on a stump or hanging them by a nail to the side of a tree.

After trapping once or twice at a station, the traps were operated manually by pulling a string attached to a stick holding the door open, so that birds already banded could go in and out of the traps, and efforts might be directed toward capturing the unbanded birds.

Some difficulty was experienced because traps in the Fuertes Bird Sanctuary were frequently stolen. To obviate this a number of "dummy traps" were constructed. These were similar to the regular traps, but had no door or trapping mechanism. Accordingly they were easier to make and less apt to be stolen. Food was put out in these so that the birds became accustomed to going in and out of them. When it was desired to catch the birds, real traps were substituted for the dummy ones.

By the middle of January nearly all the Chickadees and Nuthatches within the area studied were banded. During the remainder of the winter the various stations were visited as often as possible, in order to detect changes in the population, and movements from one station to another. By taking a position about twenty or twenty-five feet from the food and watching through a pair of field-glasses each bird as it came down to get a sunflower seed, it was not difficult to see the colored bands and determine what individuals were present. It was not always possible to identify a bird as it alighted near the food, but by watching for fifteen or twenty minutes nearly every individual in the flock would finally be seen and identified, some of them half a dozen times or more. One could get much closer to the birds than twenty feet if desired. Indeed, some of the birds learned to take seeds from the brim of my hat. However, a close approach was not deemed advisable, since some of the more timid birds might not then come to the food.

A considerable amount of time was also spent in following the birds after they left the feeding stations, in order to determine the extent of their range. Following a flock of Chickadees or a pair of Nuthatches was not at all difficult. Single birds, however, were more difficult to keep in view.

Because of the large number of trapping stations, it was not possible to keep an accurate record of the birds visiting

all of them. Efforts were concentrated on the stations in the Louis Agassiz Fuertes Bird Sanctuary. The Chickadee and Nuthatch populations and the movements of the birds within this area were accurately determined. The other stations were used as a check on observations in the Sanctuary, and to determine whether the birds ever travelled longer distances.

The Fuertes Sanctuary is a typical bottom-land wood, with an area of about eighty acres. The trees composing it are mostly elm, red maple, sycamore, and willow, with a thick undergrowth largely of spice bush and black elder.[1] The remainder of the area where the birds were studied is largely a semi-wooded suburban residential section.

LITERATURE CITED

BURKITT, J. P.
A Study of the Robin by Means of Marked Birds. *British Birds*, 17:295. 1924.

BUTTS, W. K.
The Feeding Range of Certain Birds. *The Auk*, 44:329-350. 1927.

DROST, R.
Das Färben lebender Vögel als Hilfsmittel in der Vogelzugsforschung. *Ornithologische Monatsberichte*, 33, Mar., 1925.

GAIN, L.
Penguins of the Antarctic Regions. Rep't. Smithsonian Inst., 1912:478.

LINCOLN, F. C.
Instructions for Banding Birds. U. S. D. A. Misc. Circ., 18:27. 1924.

LLOYD, HOYES.
Another Mystery Band. *Can. Field Nat.*, 41:139. 1927.

WATSON, J. B.
Behavior of the Noddy and Sooty Terns. *Papers of Tortugas Laboratory of the Carnegie Institution of Washington*, 103. 1908.

WATSON, J. B. and LASHLEY, K. S.
An Historical and Experimental Study of Homing. *Papers from Dep't. of Marine Biology*, Carnegie Inst. Wash., 7:1-60. 1915.

WHITTLE, C. L.
Notes on Colored Bands. *The Auk*, 42:136. 1925.
Sight Return of Junco. *Bul. N. E. B. B. Ass.*, 2:16-17. 1926a.
Sight Repeats. *Bul. N. E. B. B. Ass.*, 2:37-38. 1926b.
Catbirds and Colored Bands. *Bul. N. E. B. B. Ass.*, 2:56-57. 1926c.
A Recommendation to Bird-Banders. *Bul. N. E. B. B. Ass.*, 3:17, 44-45. 1927.
An Unusual Sight Recovery Record of a Purple Finch. *Bul. N. E. B. B. Ass.*, 4:108. 1928.

(TO BE CONTINUED)

[1] For a more detailed account of the ecological characteristics of Fuertes Sanctuary see Allen, "The Redwinged Blackbird: A Study in the Ecology of a Cat-tail Marsh." Abs. Proc. Linnæan Soc. N. Y., Nos. 24-25, pp. 48-74, 1911-13.

NOTES ON PROTOCALLIPHORA DURING THE SUMMER OF 1930[1]

By CHARLES W. JOHNSON

Boston Society of Natural History

I WAS unable to make any further study of the effect of the blood-sucking larvæ of Protocalliphora on nestling birds during 1929. Lester W. Smith, of Babson Park, Massachusetts, reported that in the spring of 1929 a cold spell of weather probably added to the loss of Bluebirds and Tree Swallows, but estimated that probably eighty per cent of the first brood of Bluebirds died from the effects of the blood-sucking larvæ. The young of the Tree Swallows have been found dead less frequently than those of the Bluebirds although the blood-sucking larvæ were present.

A Bluebird's nest was sent to me by Mr. Smith May 19, 1930. The five well-feathered nestlings were dead. The nest contained 148 puparia, from which emerged 135 flies, *Protocalliphora sialia* Shan. and Dobr. No parasitism of the puparia by the little chalcid *Mormoniella vitripennis* Walk. (*brevicornis* Ashm.) was evident. One small tachinid, *Plectops pruniosa* Mall. was among the other flies.

Referring to a Bluebird's nest received from William P. Wharton of Groton, Massachusetts, May 14th, Mr. Wharton says: "There were originally five young birds. When I looked at the nest a week or so later with a view to banding, I found four recently dead, and the live one had six or seven maggots attached to it. Probably the old birds had deserted the nest in this instance, for the surviving nestling was later found dead in the new nest which I had placed in the box." From the nest sent me 57 flies (*Protocalliphora sialia*) appeared, but the parasite of the fly was not present.

On May 25th Mr. Wharton sent another nest with the following note: "The nest sent you yesterday was that of a Bluebird in which two young hatched about six days ago. On finding a maggot on one of the birds yesterday, I decided the best thing to do was to remove the nest and send it to you

[1] It is the policy of the editorial department of *Bird-Banding* to restrict its contributions to articles and notes which to an important extent are based on bird-banding work or on related methods of research. This paper of Mr. Johnson's comes within this category since bird-banders as a part of their activities collected the nests and parasites serving as the basis of the paper as well as accompanying data of scientific interest.—EDITOR.

and make a new nest for the young birds." The nest contained larvæ that changed to 60 puparia, from which emerged 25 flies; 27 of the puparia were parasitized, and 18 were dead. The larvæ were small, but little more than half grown, and without further food produced a brood of small flies. This brood shows one interesting feature in that the larva of the fly is parasitized by the little chalcid when about half grown, but destroys the fly when in the pupa stage. All the puparia that have been parasitized can be readily recognized by little holes in the puparia through which the chalcids have escaped. Another Bluebird's nest was received from Mr. Wharton, June 17th. Four of the five young birds were dead. The nest contained 74 larvæ, 10 of which were put in alcohol; 64 pupated, and from these 52 flies emerged, while 5 were parasitized and 7 were dead. The nest contained many larvæ of a flea—*Ceratophyllus* sp.

On May 19th Mr. A. W. Higgins, of Rock, Massachusetts, sent a Bluebird's nest, the five nestlings having been killed by the larvæ of Protocalliphora. Mr. Higgins counted 219 larvæ in the nest. There were two series of maggots, the large ones that were ready to pupate and the smaller ones that were about half grown. Of the entire lot 143 pupated, from which emerged 98 flies of *Protocalliphora sialia*. No parasites of the fly were present.

A second Bluebird's nest was received from Mr. Higgins July 1st. The nestlings managed to live notwithstanding the fact that Mr. Higgins counted 184 maggots. When I examined this nest there were only 72 puparia, but two flies emerged, 61 of the puparia were parasitized, and 9 were dead. This was another remarkable case of parasitism, similar to the second nest sent by Mr. Wharton. Both represent the second brood of the Bluebirds, evidently indicating that the little chalcid is not present or is ineffective during the time of the first brood.

In a third nest built by the same pair of Bluebirds about July 10th, Mr. Higgins says, "no maggots of the Protocalliphora were present." Was this due to the effective work of the parasite in the second brood, so that the flies of Protocalliphora were not present to oviposit in the third brood, or was it owing to the lateness of the season?

Under date of July 28th Lester W. Smith writes: "I found a Bluebird using a box for second brood with practically no nest material in the box. A few blades of dry grass circled the inner edge of the box, leaving the four eggs on the bare wood at least half an inch from the grass. This was just

before my vacation. On my return I found one well-feathered body of a young bird in the nest, and evidence in dung that the others had been reared and had flown. Not a single pupa-case of Protocalliphora was in the nest, and what caused the death of the young bird was uncertain. Do you suppose this absence of a nest was intentional on the part of the adult birds in order to escape from the Protocalliphora?"

A Tree Swallow's nest received from Mr. Smith June 23d contained 44 puparia; 2 flies emerged, 39 were parasitized and 2 were dead. A House Wren's nest contained 4 small puparia from which the flies emerged and escaped. A second Wren's nest contained 2 small puparia, both parasitized.

In a letter dated August 11th, Charles L. Whittle, of Peterboro, New Hampshire, says: "I am sending you a Bluebird's nest with one dead young bird, all the nest contained. In the bottom of the nest are live maggots." On examining the nest I found 26 maggots, all of which pupated by the 15th. Under date of August 14th Mr. Whittle writes: "Regarding the pair of Bluebirds of the nest I sent you, may I add that this last nesting was their fifth attempt to raise a family this season and the only case where the eggs hatched? The four other nests were abandoned during incubation. One clutch had five eggs with embryos about half grown. It is a mystery why the nests were abandoned. In only one case was the nest found slightly disturbed. Is it likely that maggots could so annoy the adults as to cause them to abandon the nest?" This seems to me quite likely, especially if they attempted to build in bird-houses from which the old nests had not been removed.

A letter was recieved from Miss Helen Robinson, of Brewer, Maine, dated June 2d, in which she says: "I am sending a Bluebird's nest for examination as I suppose it is infested with the larvæ of Protocalliphora. The five young birds died at the age of eight days." The nest received represented only the upper portion and no larvæ or puparia were present. The maggots usually hide in the daytime in the lower part of the nest.

Mrs. R. B. Harding obtained from the nest of the Redstart, at Holderness, New Hampshire, June 27th, puparia from which emerged 16 flies, all representing the typical *Protocalliphora splendida* Macq. This is the third instance where Mrs. Harding has obtained only the typical form from warblers' nests, the others being obtained from the Black-throated Blue and Chestnut-sided Warblers. As only the typical *sialia* was found in all the nests of the Bluebird, Tree Swallow, Barn Swallow, and Crested Flycatcher, I am inclined to doubt that

sexual dichromatism exists, at least in this section and think that we are dealing with two distinct species.

On August 10th Mrs. Harding also obtained some more *P. splendida* from the nest of a Redstart, and on the same date *P. splendida* from the nest of a Blue-headed Vireo, a new host for the fly.

Mr. Wharton, asked as to the results of his removing the old nests and replacing them with new ones, says: "The experiment of removing the maggot-infested nests and substituting a clean one seems to have worked out very well. In three cases where I changed the nests of the Bluebirds the outcome was not so successful, but the failure of the young to survive was not due to the parents not feeding the young. The nest of May 25th was changed while all the young were alive, and the old birds were noticed feeding them very soon afterwards. When I inspected the box five days later it was empty. In view of the age of the young when the nest was changed it seems unlikely that they could have left the box fully fledged. I am inclined to think that some enemy carried them out. At any rate the outcome does not indicate a failure of the method for combatting Protocalliphora. In the nest of June 16th three out of the four young were found dead. After the nest was changed the parents continued feeding the survivor. On June 18th I banded the nestling, and it seemed all right, but on June 30th I found it dead. From indications I assume it died from digestive trouble. I still think that this method has considerable possibilities, especially if the change can be made before the young have been much weakened by the attacks of the blood-sucking maggots of Protocalliphora."[2]

The above records show conclusively that the greatest loss to nestling Bluebirds due to the blood-sucking larvæ of Protocalliphora is during the first brood. A cold, wet spring will only increase the loss, as the vitality of the young birds is

[2]Since writing the above I received from Mr. Wharton on August 22d the following letter: "The nest I am sending by this mail is that of a pair of Bluebirds which are trying to raise a brood for the third (possibly fourth) time. I changed the nest today, although the young are only four or five days old. I have seen no sign of maggots. If you find none I shall be surprised, for, as you know, there has been an epidemic of them here." The nest contained 118 maggots varying in size from 2 to 5 mm., many of the larger ones being filled with blood. The final outcome of this brood of Bluebirds is described by Mr. Wharton in a letter dated September 5th: "The Bluebirds left the nest probably this morning for one was looking out last evening and early this afternoon the nest was empty. I saw one of the young sitting on the barn roof near its parent. I am sending the nest to you by this mail, for there are some maggots and pupæ in it. I do not know whether those could have developed since the nest was changed on August 21st, if not they may be some which were overlooked when removing the original nest."

From this nest there emerged a large number of parasites but no flies. From many of the puparia flies had emerged. This would indicate that there were puparia from two different nests.

greatly lessened by the loss of blood. It also shows that the puparia of the flies are not, or are rarely, parasitized by the little chalcids at that time. This substantiates what I have previously stated, that the first nests should all be destroyed either as soon as the maggots of the flies are detected or as soon as the fledglings have left the nest.

From the dates of capture of the flies in the field and the habits of a number of allied muscid flies, there is no doubt that Protocalliphora hibernates as an adult and awaits the arrival of the birds in the spring to oviposit in their nests. Specimens of the fly taken at various places bear the following dates: Colebrook, Connecticut, Sept. 5th, (W. M. Wheeler); Southwest Harbor, Maine, Sept. 6th, (C. W. Johnson); Little Black River Rapids, Maine, Sept. 8th, (J. A. Cushman); Brookline, Massachusetts, Sept. 29th, (C. W. Johnson); Rumney, New Hampshire, Dec. 22d, in a dead pine, (P. J. Darlington, Jr.); Concord, Massachusetts, Jan. 10th; Wellesley, Massachusetts, Apr. 13th, (A. P. Morse); Colebrook, Connecticut, Apr. 19th, (G. C. Wheeler); and Sherborn, Massachusetts, May 4th, (E. J. Smith).

The large percentage of puparia parasitized in the Bluebird's nest sent by Mr. Wharton May 25th, also in the one sent by Mr. Higgins July 1st, and in the Tree Swallow's nest sent by Mr. Smith June 28th is most gratifying, but as a whole there seems to be less parasitism than in previous years.

In preparing this paper I am greatly indebted to Messrs. L. W. Smith, William P. Wharton, A. W. Higgins, and C. L. Whittle. Also to Mrs. R. B. Harding and Miss Helen Robinson for their kind assistance in furnishing nests and data.

HOURS OF THE DAY WHEN HARRIS'S AND WHITE-THROATED SPARROWS WERE TRAPPED DURING MIGRATION

By O. A. STEVENS

THE writer's trapping station has been especially a migration station where White-throated and Harris's Sparrows make up a large proportion of the birds taken. No returns on these birds have occurred in three years' operation; consequently intensive study during migration is the chief field of activity. In the fall of 1929 the records of each visit to the traps were kept separate to see what could be learned regarding the habits of the birds in this respect. A preliminary study of these results seems very largely negative, and it is thought desirable to present the same to raise the question whether further effort in this direction is desirable or in what way it should be undertaken.

About seven traps were in operation and were arranged in three groups about fifteen or twenty rods apart. From September 18th to October 27th the total number (including all repeat records) of birds removed from the traps at different hours of the day was as follows:

8 A.M.	12 M.	3 P.M.	6 P.M.
324	248	329	342

September 22d to October 8th covers the main period, during which five visits per day (except twice each at 12 and 6) were made with the following results:

WHITE-THROATED SPARROWS

	8 A.M.	10 A.M.	12 M.	3 P.M.	6 P.M.
Number banded	24	18	17	10	16
Repeat records	40	34	36	34	49

HARRIS'S SPARROWS

	8 A.M.	10 A.M.	12 M.	3 P.M.	6 P.M.
Number banded	38	33	36	37	42
Repeat records	47	44	25	45	70

These results show a uniformity which was a surprise to the writer. The number of White-throats banded at 8 A.M. is high, and they were more evenly distributed through the period than those at other hours. Aside from this, the 6 P.M. records are notably high, especially for repeats. Both of these are probably accounted for by the fact that the traps were located near good roosting-quarters.

The next inquiry was whether individual birds show any regularity in the hour at which they appear. The nature of the results presents a considerable difficulty in approaching this question. Only repeat records can be used, and preferably those of birds which have appeared once or twice a day for several days. This type of repeat is not common. More usually the birds are present only a very few days, or, if for a longer period, they appear several times during the day. The occasional individuals which seem to form the trap habit must remain near by most of the time. These furnish a comparatively large proportion of the repeat records but cannot be used in this phase of the study.

The following table shows how few of the birds are present more than two or three days. The figures for the fall of 1928, which are more extensive for the Harris's Sparrows, are included as well as those of 1929.

Number of Days Individual Birds were Trapped.

	1	2	3	4	5	6	7	8	9	10
White-throated Sparrow, 1929	80	25	8	2	5	2	2	0	1	0[1]
Harris's Sparrow, 1929 . .	174	35	15	5	6	3	5	1	0	1[2]

Number of Days Individual Birds were Trapped.

	1	2	3	4	5	6	7	8	9	10
White-throated Sparrow, 1928	88	31	14	8	6	2	1	0	1	0[3]
Harris's Sparrow, 1928 . .	210	89	45	14	14	15	8	3	7	2[4]

For the birds which appeared only once or twice each day for two and three days the following figures appear:

	Harris's	*White-throat*
Same hour, once each day for 2 days	3	4
Different hours, once each day for 2 days . . .	18	10
Same hour, once each day for 3 days	2	0
Different hours, once each day for 3 days . . .	2	1
Three times in 2 days, twice at same hour . . .	5	1
Three times in 2 days, all at different hours . .	6	1
Four times in 3 days, twice at same hour . . .	3	3
Four times in 3 days, all at different hours . . .	1	2

More than half of the birds taken on only two days appeared once each day, and these, as shown above, usually did not reappear at the same hour. As the period increased, there was

[1] Also one for 12 days.
[2] Also one for 11 and one for 14 days.
[3] Also one for 12 and one for 26 days.
[4] Also three for 12, one for 13 and one for 19 days.

also an increase in the number of visits each day. This, with the small number at the longer period, leaves but few records which could show regular visits at particular hours. Casual inspection of the list suggests that the following are exceptional cases which approach most closely to a regularity in hours:

Harris's A150070—?; 8, 3; 8, 11; 8, 11; 8, 11.
Harris's A162522—12; 11; 11; 10; 12; 12; 8, 6.
Harris's A171044—12; 3; 3; 12; 12; 3; 6.
White-throat A162626—10, 6; 10, 6; 6.
White-throat A162627—10, 6; 6; 10; 10; 8, 10.

Nearly all the birds which were taken as many as five times during the period September 22d to October 8th appeared at either four or five different hours. Here, as in the list of those taken on two and three days, the White-throats seem to be a little more regular than the Harris's Sparrows, but the number is too small to offer more than a suggestion.

One more question was whether there is any notable association of individuals. I have charted the records for two five-day periods during the best portions of the season and find much the same results as described in the preceding paragraphs. Two days' results will serve to give some idea of the trend:

BIRDS TAKEN SEPTEMBER 18 AND 19, 1929
HOURS OF THE DAY

Stations	8	12	3	6	8	12	3	6
	045	040	045	045	040			045
G	067			060	045	060		
	501		507	507	507	507		
	507		510		518	524		528
	051		051		051		034	
B	062		062		071		071	517
	505		071	517		522	509	524
	508						512	526
	035	034	034	034				034
N								035
		509	512					040
			513					

With reference to the Harris's Sparrow, I had expressed the belief (*Wilson Bulletin*, 41:173) that aside from birds which form the trap habit, captures are largely a matter of chance. I believe the data here discussed bear out this statement. Probably little could be expected in the way of definite grouping during migration.

Fargo, North Dakota.

THE TECHNIQUE OF STUDYING NESTING SONG SPARROWS

By MARGARET MORSE NICE

IN order to study a population of nesting birds it is essential to band the adults on their territories and the young in the nests. To deal successfully with these problems one needs to be well acquainted with the life-history of the species. For my work in 1930 on more than thirty pairs of Song Sparrows in Columbus, Ohio, the intensive observation of one pair the previous year was a necessary basis for it gave me a key to the birds' behavior.

Banding Adults. The colored bands originated by Dr. W. K. Butts were indispensable to me for distinguishing the birds in the field. The majority of celluloid toys are too frail for bands, ten- and 25-cent dolls and sometimes rattles proving the best material in my experience. Pale colors faded to white after a few weeks of exposure to the weather. For holding the celluloid around the nail in boiling water I use forceps; the resulting band is slightly elliptical, but works satisfactorily.

Each pair was trapped on its own territory as a rule, although sometimes one location would attract a neighboring male. The territories of *Melospiza melodia melodia* in my area average about two-thirds of an acre, and each pair stays faithfully on its plot of ground until the fall migration, a period of seven to eight months. I baited the birds for several days before placing the trap, often choosing a spot near one of the male's "singing trees." A Government sparrow trap and a pull-string trap were used. Trapping was never carried on during incubation nor until the young were two-thirds grown for fear of disturbing the birds. Song Sparrows come to a feeding station about once every twenty or twenty-five minutes.

If possible, banding should be done early in the season, both because it is easier to attract the birds to a feeding-place before vegetation has grown, and also so as to obtain a complete record of the survival of individuals and of the constancy of the pair. During the nesting-season of 1930 about a fourth of the nesting adults disappeared. As to shifting of mates (when both survived), there was only one case in which it might have happened, and this cannot be proved because one of the birds was unbanded. Eleven pairs, I know, stayed together throughout the season.

I cannot distinguish the sexes in the trap, but depend upon watching their behavior afterwards. Before nesting has begun

and while the male is singing very little, he can usually be told by his tendency to mount bushes and she by her habit of keeping to the ground. One cannot be sure that two adults taken in the trap with young are the parents; in one case they turned out to be the father and a strange male that was trying to establish a home in the vicinity.

Banding the Young. In order to know ancestry and exact age, the young should be banded in the nest whenever possible. I prefer to do this at the age of six days, but sometimes it can be done at eight days without frightening them from the nest. If a nest is discovered with four or five young evidently ready to leave, I have found a cotton stocking a convenient place to stow the brood, extracting them one by one for banding.

Of the 61 nests of this species located in 1930, 9 were found by seeing the female building, 13 contained young, and 39 contained eggs. In general the early nests are easier to find than the later ones, because, although they are well hidden, the actions of the parents can be seen, whereas late in the season the female can come and go entirely concealed by the heavy growth, and the male has little zest for singing. Yet, because late nests are usually built above the ground, they are sometimes more conspicuous than the early ones.

It is not easy, as a rule, to find a nest with young, for the parents are suspicious then; they may descend to the ground at some distance from the nest, and during the latter part of nest-life there is no flushing female to give away the site. One has to watch at a considerably greater distance than during incubation and may not be able to find any satisfactory vantage-point. The parents show more concern over young recently out of the nest than over those still in it.

Most of my nests were discovered while they contained eggs. To get a clue to the site, I select a seat overlooking as much as possible of the territory and wait, watch in hand. The male normally does a good deal of singing while his mate is on the eggs; as long as the song is fairly continuous, it helps little as to the nest location. Usually he stops singing and disappears into the grass, and then after some minutes he flies to a new perch and gives one or more songs suddenly and loudly as a signal to his mate. The female in response often leaves the nest immediately, sometimes after a minute or two, and occasionally not until some time later. She may utter the characteristic *chink* as she appears. The "signal song" may be given as near as five feet or farther than fifty from the nest; the singer usually faces it, but sometimes per-

sistently looks the other way. He very rarely visits the nest while it contains eggs. The female returns to the nest in about eight minutes. Keeping the places of appearance and disappearance both in mind, I then begin the search, getting the final clue from the female, who flushes only upon close approach. The routine of incubation is about twenty to thirty minutes on the nest, and seven to nine minutes off throughout the day, but both periods are sometimes longer or shorter. At times this method of nest-discovery fails because it is impossible to get a satisfactory view-point for watching the birds; also late in the season the male has so little energy for singing and the female so much cover that the birds may be able to keep their secret to themselves. It will be interesting to know whether this practice of the male singing his mate off the nest obtains with other birds.

Resumé of Nesting Activities. Song Sparrows near Columbus attempt to raise three broods, often laying a fourth set if one or more nests meet with disaster. Territories were taken up by the males between February 5th and March 15th this year, the females arriving between February 21st and April 16th. The male sings a great deal before the arrival of a mate and almost none after that until nesting starts. He sings with enthusiasm during incubation but little while feeding the young in the nest, beginning once more with incubation of the second nest, his zeal gradually diminishing with the approach of the molt. Both birds carry nesting-material in preliminary activities, but when the site is finally decided upon the work is done entirely by the female. Incubation lasts 12 days; the young normally stay in the nest from 9 to 11 days, usually 10, and are fed by their parents for 14 to 18 days more on or near their territory, except in the case of the last brood, when the whole family may wander away. After a nest has been broken up, the new set of eggs is usually complete in 9 days, and the brood leaves from 28 to 30 days after the date of the disaster. When two successful nestings follow each other, the later brood leaves the nest from 30 to 41 days after the flight of the first.

Records. For a field record of the nests I use large sheets of lined paper divided into nine columns, each column being devoted to a pair, and each horizontal line to a day, so that one page gives a brief account, useful for ready reference, of nine pairs for three weeks or so. Each day that I positively identify one of the adults, seeing the bands or recognizing a song, I underline the notation, as "♂ sings," "♀ feeding young," so that if one of the birds disappears later there is a

record of when it was last seen. For detailed observations I use large note-books. In the one I carry with me there are the daily records written in full, a map of the region with the location of each pair, inside the back cover each bird's field number, sex, banding scheme, and band number, and opposite it a key to the birds arranged according to the color of the band. In another note-book several pages are devoted to the summarized history of each pair.

In designating my birds the band-numbers are disregarded entirely in practice, for they are cumbersome to use and difficult to read, moreover they show neither sex nor relationships. Besides, a bird has to have a name before it is banded, and some that I dealt with never reached that distinguished stage.

My birds are numbered from 1 on, the position of each pair being recorded on a map. Since the male is the one that takes up the territory and has the distinctive songs, he is given a number that belongs to him alone, a successor on his territory being given a new number. Females are named according to their first mates, *i.e.* 25f. When it is necessary to distinguish different mates, the year is given, as 1f28, 1f29, 1f30; if there are more than one in a season, they are labelled 4f30a, 4f30b, 4f30c. But if one is considering only one season, 4fa, 4fb, 4fc will be sufficient. When a female changes mates, her second name is added to her first, as 1f29:5f30—the bird that was 1's mate in 1929 and 5's mate in 1930; 27f30:26f30b—27's mate early in 1930 and later the second mate of 26. If 26 and 27f remate next year, her formula will be 27f30:26f30b, 31. These double and triple names are only for the records: the second female can be known simply as 27f since 27 disappeared unbanded, but the former will have to be 1f29 since 1 has had other mates.

Ancestry can be shown by parentheses after the bird's first number, for instance—13f30(1, 1f29):30f30b, *i.e.* 13's mate was the daughter of 1 and 1f29; after 13's death she mated with her neighbor 30, who had lost his first mate. Grandparents can be given in brackets after each parent, great-grandparents in parentheses within these, etc. For example, here is a hypothetical case: 113(60[17, 17f30], 60f31[13, 13f30 (1, 1f29)]), which means that 113 is hatched in 1931, the son of 60 who was the son of the 17s in 1930, and of 60f the daughter of 13 and 13f, who in turn was the daughter of 1 and 1f29. Young birds receive no field numbers unless they return and nest.

A complete designation of the bird includes the band-

number, the manner in which it is banded, the field number and its marital and ancestral relationships, but for everyday use all that is needed is the shortest form of the field number. This scheme of nomenclature is convenient in practice and distinctive for each bird; it shows sex, and mates each year, and when necessary can give all known information as to progenitors.

Now that we have the Biological Survey bands that tell us whether individuals return and the celluloid bands that enable us to recognize them in the field, the way is open for endless possibilities in life-history studies.

156 Patterson Avenue, Columbus, Ohio.

FURTHER BANDING NOTES FROM TERN ISLAND, MASSACHUSETTS[1]

BY CHARLES B. FLOYD

THE seventh season's work among the Common Terns (*Sterna hirundo*) and the Roseate Terns (*Sterna dougalli*) at Tern Island, Chatham, Massachusetts, began on July 5th of this year. Prior to that date, in June and July, 1930, many immature birds of both species were banded by Warden Everett Eldridge, Jr., and a member of the Northeastern Bird-Banding Association. Upon the writer's arrival on the 5th most of the young were flying and could be observed about the island and near-by beaches in large numbers. The first day was spent in banding the young, and 704 Common and 101 Roseate Terns were handled. There were few nests with eggs or young, and the number of dead seemed unusually small, which indicated that the weather had been favorable for the successful rearing of thousands of young Terns (June was a month of warm weather with little rain), that the adults were finding food in abundance and were able to keep the young well fed, and that the birds in this rookery were not subject to the enemies that attacked those in many of the near-by colonies. At Billingsgate Island, lying approximately twenty-five miles northwest, the Terns were robbed of their eggs in 1929 by a party of egg-

[1] For previous papers on banding operations on this island, see *Bulletin Northeastern Bird-Banding Association*, Vol. I, p. 58; Vol. II, pp. 32 and 68; Vol. III, p. 95; Vol. IV, p. 125; and Vol. V, pp. 43 and 144.

hunters, and their young were killed and carried away.[2] It is believed that this raid was made by a few foreigners from a fishing colony on the mainland. At the Pamet River colony, five miles east and close to the mainland, the residents and summer visitors with dogs were a source of constant annoyance and undoubtedly caused many casualties among the young and considerable destruction of eggs. Large ants killed some of the newly hatched, and deaths from disease and exposure were not infrequent in 1929. This year it appeared that these agencies of destruction were absent and the breeding-season on Tern Island was a success.

The objects of this year's operations were, in the order of their importance, to trap as many of the adults as possible and thus take what we could of the terns of previous years' banding, to obtain some definite knowledge of the food eaten by old and young, and to devote such time to the banding of immature birds as would not interfere with our other work.

The time to trap the adults with the greatest possibilities of success is during the period when full sets of eggs have been laid or the young are small and need the constant protection of the parents from the sun's heat or rain and fog. Early hatching made the trapping more difficult, and fewer birds were taken per hour than in previous years. Some were just beginning nesting for the second time this year, and there were few nests with more than one egg and not a newly hatched chick was seen. Instead, therefore, of capturing the adults in large numbers each day, with the exception of the first day, there were times when we averaged less than two adults an hour. After working in one place a limited time we moved to the next to give the birds access to their nests. Common Terns prefer the open sand; Roseate Terns select the long grass in which to conceal their eggs, while the Arctic Tern mingles with the Common Tern or accepts the middle ground. Years ago the island was without vegetation, and the old inhabitants of Chatham state that many Herring Gulls nested here, far outnumbering the terns. The island has been slowly fertilized by the birds, and the gulls have vacated, leaving terns in complete possession. At the present time there are only three or four open places on the island such as the Common Terns prefer, and it will be interesting to note in years to come whether or not because of the complete covering of the island

[2] Austin, Oliver L. Jr., *Bulletin of the Northeastern Bird-Banding Association*, Vol. V No. 4, p. 126.

by vegetation the Roseate Terns will increase and the other species gradually decrease.

We trapped over the open spaces, using simple wire drop-traps placed over eggs or young and operated from a distance by long pull-strings running to a common center where the operator sat. The birds were tame the first day, and we captured 172 Common and one Roseate, the latter the only one of this species taken, and of these ten proved to be returns. Two were banded in July, 1925; three in July, 1926; one in July, 1927, and one in July 1929. The 1929 Tern, a Roseate, was sitting on eggs when captured, and this is the first record of the breeding of a bird of this species during the first year of its life. The second day's trapping produced only thirty-five birds, among which were two returns, and the catch dwindled until our total for the last day was seven, all of them unbanded.

The operator of a battery of traps has opportunity to study the terns at close range and observe every movement and reaction of the colony as well as the individuals of each nest. After the traps were set, the birds settled down and came slowly back to their nests. One under our immediate observation alighted in the sand before the trap, paused a moment, and then entered the trap. Another flew over the trap in circles, finally alighted, but almost instantly flew off again. This performance was repeated many times before the bird finally went to its nest. Another bird, after circling about in the air for some time, alighted on the top of the trap, where it balanced awkwardly and pecked at the wire, all the time scolding and quite unable to solve the problem of finding an entrance. It remained on the trap until frightened, when it continued its circling flight, returning at length to the top of the trap. This performance was repeated time and time again, until we removed the trap and gave up trying to capture it. Still another, after recovering from its fright, dropped to the ground in the rear of the trap and walked back and forth, pecking at the wire.

Fears have been expressed by ornithologists that with the advent of airplanes as a growing means of transportation many water-birds, such as terns, gulls, geese, and ducks, would not become reconciled to their noise and presence, thus being frightened away from the territory where airplanes are flown. Such has not been the case, however, on this island, for we witnessed the unusual sight of a small airship, commonly known as a "blimp," sailing low over the island one morning about nine o'clock. We observed the action of the terns closely and were surprised to note that there were no

signs of alarm or sudden flight. The birds, on the contrary, paid no attention to the passing of the silvery airship that sailed the length of the island and back again at a very low altitude.

It is generally believed that the food of terns is composed in greater part, if not entirely, of sand-eels and small fish known by fishermen as "bait" or "sperling"—two names that refer to the small fish that run in large schools and are preyed upon by several species of fish eaten by man. In order to determine exactly what serves as food for these birds, we collected all the specimens possible that were in sufficiently good condition to be identified. The fish were found on the ground near the nests, where they were dropped or cast up by the birds when alarmed. These were examined and identified by William C. Schroeder, of the Museum of Comparative Zoölogy at Cambridge, Massachusetts. We secured fifty-six specimens, representing the following species, which are all common on the Atlantic Coast:

Silverside (*Menidia notata*)	3	specimens
Sea Herring (*Clupea harengus*)	8	"
Butterfish (*Poronotus triacanthus*)	19	"
Sand-eel (*Ammodytes americanus*)	8	"
Squirrel Hake (*Urophycis chuss*)	12	"
Killifish (*Fundulus heteroclitus*)	6	"

The results of this seventh year's work were a goodly number of adults trapped and banded, with interesting returns, in addition to banding several thousand immature terns. One return is the first on record of the breeding of a Roseate Tern when one year old. The view held by me in 1929 that neither Common nor Roseate Terns breed when one year old (see *Bulletin of the Northeastern Bird-Banding Association*, Vol. V, pp. 147 and 148) is shown by this return to be incorrect so far as the latter species is concerned. Definite information was obtained concerning the species of fish which comprise in large part the food of young and old at this season of the year.

Auburndale, Massachusetts.

GENERAL NOTES

A Problem in Catbird Distribution.—To understand this problem in Catbird distribution, if it is such, one must have a full description of the locality of the banding station. The main business thoroughfare in the section of the town in which I live divides into two concrete highways about five hundred yards from the banding station. On the outer sides of the "Y" thus formed, grocery stores, bakeries, lumber-yards, and filling stations continue on both sides. The triangle within the "Y" has grown up wild with briars, locust, wild cherry, scrub oak, and a few maples, being a tangle of brush and trees until it runs into the lawns of the residential section.

At a point where the branches of the "Y" must be some two hundred yards across, my banding station occupies the southwest corner of this top stretch. Judging from previous observations, I should think that there was just enough room for five pairs of Catbirds, at the most, to nest in this thicket with harmony. An extensive search in the late fall brought only two nests to light that could be considered as belonging to Catbirds. However, allowing for five resident pairs of these birds and supposing that each pair successfully raised two broods of four each, the seasonal Catbird crop plus the resident pairs at this station would equal fifty individuals. It is improbable that we banded each individual that visited this station, yet in the season of 1929 we trapped and banded ninety-five Catbirds, only nineteen of these being definitely recorded as immature. My problem is to explain the abundance of this species in such a small area—approximately half an acre.

The order in which these birds were caught during 1929 is as follows:

Month	*Individuals*	*Adults*	*Immature*	*Repeats*				
				May	*June*	*July*	*Aug.*	*Sept.*
May	4	4	0	1	2	1	1	0
June	3	3	0		1	0	0	0
July	29	13	16			2	1	0
August	45	42	3				5	3[1]
September	14	14	0					1
	95	76	19	1	3	3	7	4

It is easily possible that some of the birds listed as adults may have been birds of the year or immature. However, all were closely inspected, and while it was hard to be sure about some, the birds were listed as closely as possible as to their age. Immature birds were judged by the pale rufous color of the under tail-coverts and a fluffiness of these feathers. This characteristic was accompanied in some instances by pale yellow fleshy skin at the base of the mandibles, although this was not apparent in all individuals so listed.

My first attempt to account for this abundance of Catbirds at my station, was the supposition that this species in the spring migration spread out and traveled singly or in twos and threes, while in the fall flight they traveled in groups of a dozen or more, perhaps by families. After catching 79 Catbirds earlier in the 1929 season, on August 29, 1929, we caught seven more new birds. The traps and bait used were always the same, water being the principal bait. Possibly the fact that it was drier in the fall of 1929 than in the spring, brought more birds to the traps.

The present returns for 1930 shed very little light on the problem and are as follows:

[1] One bird reported to the Biological Survey two weeks after banding as being found dead a few miles south of station.

Individual	*Banded as Adult*	*Repeats* 1929	*Returned*	*Repeats* 1930
459043 . .	May 4, 1929	May 14 and 20	June 21, 1930	none
351522 . .	June 2, 1929	June 3	May 7, 1930	July 1
A230911 . .	Aug. 29, 1929	none	May 27, 1930	none
A230918 . .	Aug. 31, 1929	none	June 1, 1930	June 22-July 27 and Aug. 4

The second suggested solution of this problem, and the one which I believe is the best, is found in a letter Mr. J. T. Nichols, of the American Museum of Natural History, wrote me on the subject. It is well known that Mr. Nichols is an authority on birds of this region, and I quote from his letter of July 29, 1930, as follows:

"In regard to your Catbirds, off-hand, I do not believe that July-August birds of 1929 were true migrants. Presumably, at the close of the active nesting-season the territorial spacing of individuals of the species breaks down, making a concentration of the summer-resident population possible. You had such a concentration last year to an abnormal degree owing to drought conditions and general scarcity of water."[2]

On August 8, 1930, Mr. Nichols reported that the Catbirds at Garden City (about fifteen miles west of this station) were reduced in numbers; probably not half of the normal breeding population being present—a slight bit of evidence favoring a concentration hypothesis. Eleven days later, Mr. Nichols again writes that this species is still scarce at Garden City while at Mastic, a town thirty miles southwest of my station, Catbirds are still plentiful.

It has always been my belief that Catbirds, after selecting an area in which to nest, will drive all others of this species from their chosen spot. I have explained this satisfactorily to myself by believing that each pair have to have a sufficient food-supply available about the nest-site so as to facilitate the feeding of their young. This supply is assured by driving out competition. As Mr. Nichols explains, this territorial spacing would naturally break down at the end of the active breeding-season, and members of the same species would concentrate in certain select areas where the food-supply is very abundant. It is noticeable that the greatest abundance of this species occurs at our banding station at the end of the breeding-season and when the tangle of blackberry vines and the numerous wild cherry trees are laden with ripe fruit.

The lack of, or abundance of, water seems to be the controlling factor in the trapping of Catbirds with water-baited traps. The 1929 season was extremely dry, so that water bait was very attractive. During the 1930 season it was not so dry, and water-baited traps did not have an equal attraction, although this species seemed just as abundant about the station during the end of August as they were a year ago. On August 28th, fifteen unbanded Catbirds were observed at this station, ten being in sight at one time) and only three new Catbirds were trapped in water-baited traps. With the exception of one bird, no new Catbirds have repeated this year.

[2] In *The Auk*, Vol. XLIII, pp. 498 and 499, attention was called to a local movement of adult Catbirds with some young birds from their nesting-area about my banding station in Cohasset, Massachusetts, to a neighboring swamp to molt. The view of Nichols, therefore, accords with mine in respect to the probability of such a movement in August. The Catbird movement cited above was repeated for several years afterwards, and I came to the conclusion that locally nesting Catbirds, as the period of molt was in order, concentrated in a swampy tract possessing the conditions this species requires during the trying period of molt, *viz.*, water for bathing and drink, abundance of food (in this case elderberries and viburnum berries), and thick cover.—C. L. W.

The 1930 Catbirds behaved differently from the birds of the previous year. To catch three Catbirds under a four-foot drop trap was not a rare occurrence, and two at a time was fairly common last year, yet this year we have only caught two at a time once. Often in 1929 four or five of these birds played about on the top of a trap, and tussles with the pull strings were comical to watch, the birds showing no fear of the traps. However, this season an individual will fly close to the trap, inspect it, and, more often than otherwise, fly away again. Most of this season's birds have been caught in a Chardonneret trap. It is worthy of note that this species has dominated our seasonal catch this year again, although not as emphatically. The 1930 birds have been trapped as follows:

Month	*Individuals*	*Adults*	*Immature*	*May*	*Repeats* *June*	*July*	*Aug.*
May	5	5	0	0	0	0	0
June	3	3	0		0	0	0
July	4	2	2			0	0
August	24	6	18				2
	36	16	20	0	0	0	2

—Geoffrey Gill, Huntington, Long Island, N. Y., September 1, 1930.

Three Snow Bunting Returns-W, and a Recovery.—In the *Bulletin of the Northeastern Bird-Banding Association*, Vol. V, pages 66 to 76, Wendell P. Smith's paper on "A Preliminary List of Migratory Species which Return to the Same Wintering Area" gives a list of the species known to do so at that time. During the past winter (1929-30) I have succeeded in adding another species, the Snow Bunting (*Plectrophenax nivalis nivalis*) to Smith's list. F. C. Lincoln, of the Bureau of Biological Survey, wrote me that the returns given below are the first to be received by the Bureau. The details follow:

Number B80242, banded February 8, 1929, at 8.30 A.M., returned December 25, 1929, at 10.56 A.M. at the same place, repeating February 11, 1930, at 3.15 P.M., and these records of its capture give evidence that it remained about this area during most of the winter.

Numbers B80266, banded February 22, 1929, at 7.20 A.M., and B80269, banded February 25, 1929, at 8.11 A.M., were retaken as returns on March 12, 1930, at 6.42 A.M. and 7.20 A.M., respectively. Whether these two Snow Buntings wintered in this area but escaped being captured, or wintered at some other location, is much in doubt. It may be that they wintered south of here and were at the time they were retaken on their way to their northern nesting-grounds. My reason for having this opinion is from observations during two winters (1925-26 and 1926-27) that I spent at Three Rivers, St. Joseph County, Michigan. Here my last records of the presence of this species were March 12, 1926, and February 6, 1927, indicating that individuals of this species wintering south of McMillan were perhaps passing over McMillan at that time.

Up to the present time, May 23, 1930, I have banded one hundred and fifteen Snow Buntings. Below is given a table of captures of this species at my station:

Winter of	*Number Banded*	*Repeats*	*Returns*
1928–29	81	18	—
1929–30	34	6	3
	115	24	3

I am also glad to be able to report a recovery of a Snow Bunting banded by me February 23, 1929, which was found wounded at Chelmsford, Ontario, by O. Beaulien, April 18, 1929. This record was published in the *Inland Bird-Banding News* for September, 1929. Chelmsford is situated two hundred fifteen miles nearly due east of McMillan, so that the occurrence indicates that perhaps the bird was following an established migration route to its nesting-ground, going around Lake Superior on the south rather than flying directly across the lake northerly.—OSCAR M. BRYENS, McMillan, Michigan.

Brewer's Blackbird: First Nesting and Banding Record in Illinois.—On June 17, 1929, a nest of Brewer's Blackbirds (*Euphagus cyanocephalus*) was found by a nurseryman who pointed it out to C. E. Holcombe, of Zion, Illinois. Holcombe watched the nest and on June 26th called me to assist in identification. On arriving at Winthrop Harbor, about half way from the railroad to Lake Michigan on the main road to the beach, and about three hundred feet south of the road, we first observed that there were four adult birds, so we waited until we found where the females were feeding, and in this way located a second nest. The original nest contained five fully grown young, and the second one which I discovered contained three slightly smaller birds and one dead bird. All eight were banded.

This I believe is the first record of the Brewer's Blackbird nesting and of this species being banded in the State of Illinois.

C. E. Holcombe and William Farrar, of Zion, banded a nest of five and a nest of three young birds of this species on June 28, 1930, on the "Flats" near Twenty-second Street, Zion, Illinois.—W. I. LYON, Waukegan, Illinois.

A Danvers, Massachusetts, Chipping Sparrow Recovered in Iowa.—Charles H. Preston reports the recovery of a Chipping Sparrow, No. A51472, banded by him in Danvers, Massachusetts, May 10, 1926, at Lake Mills, Iowa, by Mrs. Lawrence Anderson. The bird was captured by Mrs. Anderson in her garage, date not known.—C. L. W.

Westfield, Massachusetts, Tree Sparrow Returns-W.—Mrs. Annie S. Wilder's banding statoin in Westfield, Massachusetts, is situated close to the Westfield River, which here flows easterly into the Connecticut River about eight miles away. North of her station across the Westfield River, approximately half a mile distant, is the station of Mrs. Sadie B. Knox, who has published important data on the returns of Tree Sparrows to her station. (See *Bulletin of the Northeastern Bird-Banding Association*, Vol. III, pp. 37-39.) Mrs. Wilder has operated her station since the summer of 1926. Since this time up to April 29, 1930, she has banded 709 Tree Sparrows (*Spizella m. monticola*), this species constituting over fifty per cent of her total birds banded. By seasons her Tree Sparrow bandings have been as follows:

1926–1927	115
1927–1928	181
1928–1929	275
1929–1930	138
	709

During the season of 1929-1930 Mrs. Wilder reports taking 68 Tree Sparrow returns up to March 29, 1930. The following summary gives some of the details of these returning birds, most of which returned for the first time, but some coming back from their nesting-grounds for the second and third times. Thirty-one of the returns-1, were of birds banded during the

season of 1928-1929, or 11.27 per cent. Fourteen of the 68 were returns-2, and seven were returns-3, that is 50 per cent of the returns-2 were back for the third time. The records also include eleven birds (banded by Mrs. Knox) which had been taken at her station also during previous seasons. Doubtless some Tree Sparrows visit each station as a part of their migratory movements north and south, though it is not easy to prove this to be the case. Mrs. Wilder reports that during midwinter the Tree Sparrow population is fairly stationary, as shown by many repeats—a condition much in contrast to that in November and April, when the bird population is constantly changing and repeats are few. Her comment on these facts is that many of the birds are on their way to more southerly points to winter, and that southern-wintering birds hasten through her station on their way north to their nesting-grounds. It is thought probable that the extraordinary number of returning birds is due in a large measure to this species using the Connecticut River Valley as a regular migration-route, and that the west side of the valley, with its steep mountain-slope, offers protection from the northwest winds during the winter season.

It is regrettable that we do not have a succession of closely spaced banding stations along the Connecticut River in order to trace this migrating movement in detail. One recovery only of a Tree Sparrow banded by Mrs. Wilder has been reported, a bird banded March 17, 1930, and found dead in Ware, Massachusetts, May 6, 1930. Ware is some twenty-five miles northwest of Westfield and within the drainage area of the Connecticut River, but well to the east of the river itself.—C. L. W.

Returns of Banded Ducks Liberated Outside Their Migration Route.—The following tabulation gives the returns of banded ducks which were shipped to Dr. Arthur A. Allen by me on February 28, 1918, and liberated by him at Ithaca, New York, on March 15, 1918. The ducks were trapped at Avery Island, Louisiana, on February 28, 1918.

Date Banded by E. A. McIlhenny	*Band Number*	*Species*	*Returns*
Feb. 12, 1918	36156	Pintail ♀	Repeated Feb. 27, 1918. Shot in Manitoba, Canada, May 21, 1918.
	36259	Pintail ♀	Repeated Feb. 27, 1918. Shot at Oshkosh, Wis., Oct. 5, 1919.
	36268	Pintail ♂	Repeated Feb. 27, 1918. Caught alive on Cayuga Lake, Ithaca, N. Y., Dec. 1, 1918.
	43125	Green-winged Teal ♂	Repeated Feb. 27, 1918. Shot at Morrison, Ill., Nov. 8, 1919.
Date Banded by Dr. Allen			
March, 1918	36835	Mallard	Shot Jan., 1920, at Derouen, La.
	36837	Mallard	Shot Sept., 1920, at Quill Lake, Sask.
	36838	Mallard	Killed Dec. 21, 1918, at Foraker, Osage Co., Okla.
	36839	Mallard	Killed Oct. 28, 1919, at Chamberlain, So. Dak.
	36840	Mallard	Killed Nov. 11, 1920, at Grand Chenier, La.
	36847	Mallard	Shot Nov. 21, 1918, at Blue Jacket, Okla.
	36854	Mallard	Killed Nov., 1919, at Catahoula Lake, Jena., La.
	36855	Mallard	Shot Oct. 25, 1918, at Last Mountain Lake, Sask.

36856	Mallard	Shot fall of 1919, at Washington, Iowa.
36858	Mallard	Killed fall of 1920, at Ferguson Flats, Alberta.
22298	Green-winged Teal	Shot Dec. 7, 1919, at Manville, Wyo.
35786	Pintail	Killed Sept., 1918, Hudson Bay Co. Post, Eastmain River, James Bay, Canada.
35787	Pintail	Killed Oct., 1918, Albany, Ontario.
35793	Pintail	Killed Sept. 24, 1920, at Camrose, Alberta.
36845	Mallard	Killed Nov. 19, 1921, at Lockport, La.
36853	Mallard	Shot Dec. 1, 1924, at Lake Thompson, So. Dak.
22286	Green-winged Teal	Killed Nov. 7, 1924, at Caddo Lake, Texas.

The purpose of this shipment was to determine, if possible, whether ducks have a strong homing instinct, and if, when sent out of their regular migration route, they will return to this route. You will note that all but one of the returns came from the Mississippi Valley. They prove very conclusively that this lot of birds, at least, returned to their original migration-route.

This note is preliminary to the information which will be gathered next fall and winter and in the years to come, from my express shipments of ducks outside of the Mississippi Valley route.—A. E. McILHENNY, Avery Island, Louisiana, July 31, 1930.

A Pine Warbler Return.—Of the twenty Pine Warblers (*Dendroica v. vigorsi*) banded at my station in Wareham, Massachusetts, one, No. 59882, banded April 16, 1926, was again trapped March 29, 1929.—WALTER B. SAVARY, Wareham, Massachusetts.

Yellow Warbler and Redstart Returns in Wolfville, Nova Scotia.—Ronald W. Smith, of Wolfville, Nova Scotia, reports that one of four Yellow Warblers, a ♀, No. C7368, (*Dendroica a. æstiva*) banded by him in 1929, was captured at his station on July 1, 1930. The bird nested about a quarter of a mile from her nesting-place in 1929.

A ♂ Redstart (*Setophaga ruticilla*) banded in 1929 as a nesting bird was a return this season, nesting within one hundred and fifty feet of the site of the 1929 nest.—C. L. W.

Examine Birds Killed by Automobiles.—Mr. Geoffrey Gill points out that, inasmuch as the recoveries of small land birds are so few compared with those of water birds, banders and others when they find dead or wounded birds on the highway should take pains to stop and examine them to see if any are banded.—C. L. W.

More data on "How Long do Purple Finches Live?"—This year, 1930, to May 21st, I have had 104 returns of Purple Finches as follows:

	Number Banded	*1930 Returns*		*Age this Year*	
1922	254	1		10 years at least	Adult male when banded. Has been trapped every year but 1927. Cannot be younger than a 1920 bird. Was also the only one banded in 1922, back in 1929.
1923	1092	0			Not one back in 1929, or so far in 1930. An adult female banded in 1923 was recovered in Nova Scotia in 1929. Not less than 8 years old.
1924	1043	1		8 years at least	Not trapped again until this year.
		1		7 years	Trapped in 1926 and this year.
1925	1510	1		6 years	Trapped every year but 1928.
		1		6 years at least	Trapped every year.
1926	1084	2		5 years	One trapped every year, two every year but 1926, and one only trapped in 1928 and this year.
		1	4	5 years at least	
		1		4 years	
1927	1443	9		4 years at least	14 trapped every year, 4 trapped 1929 and this year, 1 trapped 1928 and this year, 3 not trapped again until this year.
		9	22	4 years	
		1		3 years at least	
		3		3 years	
1928	1283	4		3 years at least	14 trapped 1929 and this year, 9 not trapped in 1929.
		14	23	3 years	
		5		2 years	
1929	1971	21		2 years at least	
		25		2 years	
		4		1 year	
	9680	104			

—M. J. Magee, Sault Ste. Marie, Michigan.

Wood Thrush Returns.—On May 15, 1929, the first Wood Thrush of the season was trapped. Banded with No. 459049, it promptly repeated in our traps again within two hours, but was never caught again during that year. On May 11, 1930, this bird returned and repeated again on June 6th. In July, 1929, we were fortunate in trapping four more of this species, which were probably birds of the year, although fully grown. These birds repeated in July and August and the last one repeated on September 3d. On May 9, 1930, one of these August birds returned, and it has since repeated once.

Out of seven birds banded in 1929, two have returned so far this year. Besides these two returns we have banded two new adult Wood Thrushes this season.—Geoffrey Gill, Huntington, L. I., N. Y., June 30, 1930.

Purple Martin and Chimney Swift Returns,[1].—Mr. R. V. Rapp of Vicksburg, Michigan, reports the return of three Purple Martins (*Progne s. subis*) on May 30, 1929. These birds were banded by him as adults on July 10, 1928. Another Martin banded as a fledgling on June 27, 1926, was recaptured on May 30, 1929, something less than a half-mile from its place of banding.

On July 20, 1928, Rapp banded a pair of Chimney Swifts (*Chætura pelagica*), Nos. 6020 and 74512, which nested in his chimney. The following year on August 19th he captured the pair together in the same chimney.

[1] Records in part selected from a report of Mr. R. V. Rapp of Vicksburg, Michigan, and published in the *Inland Bird Banding News*, Vol. II, No. 1, p. 3.

In response to my request for more detailed information Mr. Rapp, in letters dated August 26 and September 2, 1930, writes that during 1928 and 1929 only two Chimney Swifts nested in his chimney, so that the birds were doubtless mates for two years. He also states that this season (1930) he again trapped No. 6020 in the same chimney with four other Swifts but did not take No. 74512. These important records appear to be unique in Swift-banding.—C. L. W.

Additional Live Bird Weights.—During the last five years I have published several notes giving weights of birds trapped in Cohasset, Massachusetts, or at Mrs. Whittle's or my banding stations in Peterboro, New Hampshire.[1] As a considerable number of additional weighings have been made either at Mrs. Whittle's station in Peterboro or at my station in the same town, it seems worth while to place them on record as follows: (Those weighed at Mrs. Whittle's station have an asterisk prefixed.)

Species	*Scientific Name*	*Date of Weighing*	*Age*	*Sex*	*Weight in Grams*	*Remarks*
*Downy Woodpecker	*Dryobates p. medianus*	Aug. 17, '27	Juv.	♀	24.25	
* "	"	Aug. 20, '27	Juv.	♀	27.00	
* "	"	Oct. 28, '28	Adult	♂	27.00	
Chimney Swift	*Chætura pelagica*	June 9, '30	Adult		22.00	Nesting
*Phœbe	*Sayornis phæbe*	Apr. 30, '27	Adult		20.00	
*Blue Jay	*Cyanocitta c. cristata*	Oct. 22, '27			100.00	
* "	"	Oct. 27, '27			90.00	
Cowbird	*Molothrus a. ater*	May 25, '29	Adult	♀	42.00	No. 120621
"	"	May 2, '30	Adult	♀	38.50	Return-1S (No. 120621)
"	"	May 2, '30	Adult	♀	38.40	Av. weight 4 ad. ♀ ♀ 38.16
"	"	May 2, '30	Adult	♀	34.00	
"	"	May 8, '30	Adult	♀	40.00	
"	"	May 2, '30	Adult	♂	46.00	
"	"	May 2, '30	Adult	♂	49.00	Av. weight 4 ad. ♂ ♂ 48.00
"	"	May 2, '30	Adult	♂	49.00	
"	"	May 3, '30	Adult	♂	48.00	
*Pine Siskin	*Spinus p. pinus*	May 11, '28	Adult		14.00	
"	"	May 12, '28	Adult		13.00	
"	"	May 12, '28	Adult		13.50	
*Vesper Sparrow	*Poœcetes g. gramineus*	Apr. 22, '28	Adult		24.25	Return-3S
* "	"	Apr. 27, '28	Adult		27.00	
* "	"	Apr. 23, '28	Adult		20.00	
* "	"	Apr. 24, '28	Adult		26.00	
* "	"	May 26, '28	Adult		29.50	
"	"	May 6, '30	Adult		28.00	
*Savannah Sparrow	*Passerculus sandwichensis savanna*	Apr. 27, '28	Adult		20.00	
White-crowned Sparrow	*Zonotrichia l. leucophrys*	Oct. 8, '29	Imm.		33.50	
* "	"	May 12, '28	Adult		32.75	
* "	"	May 13, '28	Adult		31.75	
* "	"	Oct. 5, '28	Imm.		31.25	
"	"	May 6, '30	Adult		28.00	

[1] See *Bulletin Northeastern Bird-Banding Association*, Vol. II, pp. 33-36; Vol. III, pp. 20, 70, 71, and 75; and Vol. V, pp. 152-153.

Species	Scientific Name	Date of Weighing	Age	Sex	Weight in Grams	Remarks
*White-throated Sparrow	*Zonotrichia albicollis*	Apr. 10, '28			27.00	
* "	"	Apr. 25, '28	Imm.		26.50	
* "	"	Apr. 25, '28	Imm.		27.50	
* "	"	May 3, '28			32.00	
* "	"	May 4, '28	Adult		29.00	
* "	"	May 6, '28	Adult		27.00	
* "	"	May 7, '28	Imm.		22.50	
* "	"	Oct. 28, '28			27.50	
* "	"	Oct. 28, '28			28.00	
* "	"	Nov. 4, '28			31.00	
* "	"	Nov. 4, '28			34.50	
* "	"	Nov. 4, '28			33.25	
* "	"	Nov. 5, '28	Adult		30.00	
*Field Sparrow	*Spizella p. pusilla*	May 2, '26	Adult		12.00	
*Fox Sparrow	*Passerella i. illiaca*	Apr. 19, '28	Adult		40.00	
* "	"	Apr. 24, '28	Adult		36.00	
* "	"	Apr. 24, '28	Adult		40.00	
* "	"	May 3, '28	Adult		40.50	
* "	"	Nov. 14, '28	Adult		40.00	
* "	"	Nov. 17, '28	Adult		44.50	
*Rose-breasted Grosbeak	*Zamelodia ludoviciana*	May 22, '27	Adult	♂	40.00	
* "	"	May 12, '28	Adult	♂	47.50	
* "	"	May 14, '28	Adult	♂	51.00	Av. weight 6 ad. ♂♂ 46.50
* "	"	May 14, '28	Adult	♂	50.00	
* "	"	May 22, '28	Adult	♂	46.00	
* "	"	May 23, '28	Adult	♂	44.50	
* "	"	July 8, '28	Juv.	♂	42.00	
* "	"	May 23, '28	Adult	♀	51.00	Second weighing May 27, '28 48.50 grams
* "	"	May 23, '28	Adult	♀	47.50	
* "	"	May 30, '28	Adult	♀	55.50	Av. weight 5 ad. ♀♀ 48.75
* "	"	June 5, '28	Adult	♀	45.50	
* "	"	July 8, '28	Adult	♀	45.50	
*Black and White Warbler	*Mniotilta varia*	Aug. 3, '26	Adult	♂	12.50	
Myrtle Warbler	*Dendroica coronata*	Oct. 6, '29			14.00	
*Maryland Yellowthroat	*Geothlypis t. trichas*	Aug. 8, '27	Juv.		11.75	
"	"	Aug. 8, '27	Juv.		11.25	
*White-breasted Nuthatch	*Sitta carolinensis*	Aug. 21, '27	Juv.	♂	24.00	
* "	"	Aug. 21, '27	Juv.	♂	24.00	
* "	"	Aug. 21, '28	Juv.	♀	23.00	
Red-breasted Nuthatch	*Sitta canadensis*	Sept. 18, '29	Juv.		11.50	
*Robin	*Planesticus m. migratorius*	July 16, '27			82.00	
* "	"	June 17, '28		♀	85.00	
* "	"	June 17, '28	Juv.		63.50	
* "	"	June 18, '28	Juv.		71.50	
"	"	Sept. 3, '30	Juv.		76.00	In spotted plumage
"	"	Sept. 3, '30	Juv.		75.00	

—C. L. WHITTLE, Peterboro, N. H.

To Members of the Northeastern Bird-Banding Association:

The annual meeting of the Northeastern Bird-Banding Association will be held next January, the date to be announced, in connection with that of The Federation of the Bird Clubs of New England, Inc.

Last year a very successful all day session was held, the papers in the morning being given by members of our Association on various phases of bird-banding based on their own experiences.

If enough papers be available to make the morning session worth while arrangements will be made to conduct the meeting along the lines of last year.

Please send word, at your earliest convenience, to the Secretary if you are planning to offer a paper. The title and time required for its delivery may be supplied later.

October, 1930. Charles B. Floyd, *Secretary.*

RECENT LITERATURE

Der Vogelzug, Vol. I, no. 3, July, 1930.

This number begins with a report by E. Schüz on the bird observatory at Rossitten for the fiscal year 1929–1930. Among the outstanding accomplishments of the year were the completion of the building at Rossitten and the starting of a working library there. The winter work of the station was largely devoted to plans for recording and making more easily available the vast quantities of data constantly pouring in on the following topics: (1) migrations of individual species in relation to each other, (2) studies of the same species at different stages of the migration season, (3) comparisons of data of different years with relation to single species. In this connection the great projected Atlas of Bird Migration in Europe has been undertaken by Weigold and Schüz, thereby joining the forces of the two great German stations (Helgoland and Rossitten) in this work. The other manifold activities of the station are indicated by the large number of papers, based wholly or in part on Rossitten records and material, published during the past year.

Drost, writing from Helgoland, discusses the migrations of the Ring Ouzel (*Turdus torquatus*). Scandinavian birds banded on migration at Helgoland, were found wintering in various parts of France; one English bird was taken in Algiers.

In another paper Drost discusses the time of day at which migrants depart, and its correlation with light. He produces evidence in support of his contention that individual species are fairly constant in this regard. This is a distinct refinement of the old notion that there are only two groups of migrants—diurnal and nocturnal.

Heyder writes on the mutual relations of migrating birds and notes that in mixed flocks containing several species the flock as a whole derives some appreciable benefit from the total of the differences of the reactions to experience and the rapidity of danger-perception, etc., of its individual component members. Thus, species slow to recognize one particular form of danger are protected by their association with others quick to sense this type of trouble, others naturally more silent are guided somewhat at night by the noises produced by their more loquacious companions.

Rüppell contributes some observations on the migrations of the Black-throated Diver on the bay near Rossitten, especially with regard to the

general agreement of the direction of the prevailing wind and of the line of flight. He also has a short paper on the plan of dispersal of crow-traps in this area, taking advantage of local environmental factors in the placing of the traps. Schildmacher presents some observations on a number of migrants on Sylt Island, where he went in order to check and extend some simultaneous observations being made at Rossitten.

Among the short notes are two of particular interest. One has to do with the establishment of a new banding station in southeastern Europe. This has been started by the Royal Bulgarian Museum at Sofia. The other has to do with a remarkable return record of a banded bird. A Cormorant, *Phalacrocorax carbo sinensis*, banded in Holland on July 9, 1928, was shot on a lake near St. Paul, Minnesota, early in 1930. Besides being a case of a transoceanic flight it is also the first record for the southern European cormorant in North America.—H. F.

British Birds. Volume XXII, June, 1929, to May, 1930. This publication for twenty-one years has stood sponsor for the "British Birds' Marking Scheme" and in the issue for March, 1930 (pp. 258–265), H. F. Witherby celebrates the coming of age of the Scheme with a review of progress. Over a quarter of a million birds have been "ringed" since the inauguration of the plan in 1909 (258,791 birds). In 1929 the "catch" was 25,243 birds. Dr. H. J. Moon led the "ringers" in 1929 with a total of 3281 birds of 52 species. Of the 107 species ringed since 1909, six species have passed the 10,000 mark, the Song Thrush leading in popularity with 31,523 birds ringed, the Blackbird being second with 21,999 birds. It is interesting to note here that of these two species of song and insectivorous birds, recoveries in the case of the Song Thrush totalled only 1.5 per cent and in that of the Blackbird only 2.5 per cent. The largest percentages of recoveries were with the Merlin, 124 birds ringed, 21.8 per cent recoveries; Mallard, 2990 ringed, 19.5 per cent recoveries; Cormorant, 821 ringed, 18.4 per cent recoveries; Sparrowhawk, 245 ringed, 16.5 per cent recoveries. Of the nine species which show a recovery ratio of over 10 per cent, three were hawks, three ducks and the others were the Common Heron, Cormorant and Shag.

After listing the species which were ringed in the largest numbers and a few of the rarer species of special interest, Witherby goes on to review results and to make suggestions. As a pioneer in the marking of birds his views are of decided importance. He reiterates that "the test of the usefulness of the scheme rests entirely on the number and value of the recoveries." He believes that "the proportion and value of recoveries could be increased if ringers would have more regard for this than merely to make up a large number of birds ringed." He urges that greater attention be given to trapping adult birds and less to ringing nestlings, a view which was advanced in this country ten years ago by S. P. Baldwin and which has greatly increased the value of bird-banding in America. Witherby suggests several problems which might be answered by ringing, among them the question of why some individuals of certain species migrate when other individuals remain stationary or permanent residents of a locality.

In the September, 1929, issue (pp. 74–92), A. Landsborough Thomson has an interesting article entitled "The Migration of British and Irish Woodcock: Results of the Marking Method." The records of the Aberdeen University, "British Birds" and many private marking schemes furnish extensive data but their lack of uniformity emphasizes the advantages of the American plan of one central control of all banding operations. The results of the marking and recoveries are carefully tabulated and analyzed and the article should be read by all who are interested in bird-banding

as an aid in the study of migration. Practically all the birds were young birds when marked. About 60 per cent of the recoveries were within one year of the date of marking and 95 per cent were within four years. Single birds were recovered when 8½, 11, almost 12, and 12½ years old respectively. As a result of the various ringing "schemes" it is obvious that "a great many Woodcock remain in their native districts throughout the winter" but that "on the other hand, some migrate to a greater or less extent." British-reared Woodcock have been taken in Portugal, Spain, France and Norway, while birds marked in Russia and Sweden have been taken in the British Isles. There is some evidence of an erratic northward dispersal similar to that shown by some of our American herons. The article ends with a bibliography of eighteen titles.

In the issue for December, 1929 (p. 200), H. W. Robinson advanced the query "Do Puffins get their Rings off?" He ringed 399 adult Puffins in Orkney in 1928 with the aid of the light-keepers. Soon after ringing these birds the keepers examined the colony and were unable to locate any ringed birds and no marked birds were recovered on the island during the following season. In 1929 a different type of band was used on 80 Puffins and "on going round those burrows later the keepers found that these clip rings were still upon their legs." Robinson asks whether the Puffins may not be able to remove overlapped bands with their formidable beaks.

In the April, 1930, issue (pp. 289–292) D. L. Collenette describes experiences in "Bird-Trapping in a Suburban Garden" in Essex, only nine miles from Charing Cross. Two types of traps are illustrated by photographs, one a net-trap operated by a trigger and powerful springs, the other a large pull-string trap. Small pieces of bread and half rotted apples proved the best bait though bird-seed attracted Chaffinches in severe weather. Strawberries were excellent bait in June. Fourteen species were taken between October 28, 1928, and April 14, 1929. Many of the birds repeated but the station has not been operated long enough to record returns after a migration.—J. B. M.

The Wilson Bulletin. Volume XLII, No. 1. William Brewster Taber, Jr., writes on "The Fall Migration of Mourning Doves" (pp. 17–28). A map shows graphically the points of banding and of recovery, connected by straight lines. There are apparently three points of concentration of Doves in their winter range, southern Georgia and northern Florida, southern Louisiana, and northeastern Texas. Doves banded east of the Appalachian Mountains were taken in the first area, birds banded in the Wabash River Valley (Illinois and Indiana) migrate to all three areas, and birds trapped west of the Wabash area migrate only to Louisiana or Texas. A graph shows the weekly rate of trapping Doves and tables give much interesting data. Taber concludes with a number of deductions and theories but he states in the beginning "whether or not several of the theories herein developed will be tenable after further evidence is accumulated it remains for the future to disclose."

Volume XLII, No. 2. Wyman R. Green describes "Chimney Swift Banding Operations at Chattanooga" (pp. 110–118). With the coöperation of students of the University of Chattanooga, 3737 Swifts were banded between October 16, 1928, and October 19, 1929, but nearly 9000 more Swifts were captured and released unmarked for lack of bands of the proper size. Seventeen Swifts had already been banded elsewhere, thirteen at Charleston, West Virginia, one at Kingston, Ontario, one at Thomasville, Georgia, one at George School, Pennsylvania, and one at Lafayette, Indiana. Only three of the Chattanooga Swifts have been reported from other points, one from North Bay, Ontario, one from Markstay, Ontario, and one from Decatur, Tennessee. Excellent phographs show the type of trap developed for this work and practical hints are given for its management. Mr. Green closes with an appeal for coöperation from banders wherever Chimney Swifts are to be found.—J. B. M.

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

(Published Quarterly)

CHARLES L. WHITTLE, *Editor*
River Crossroads, Peterboro, New Hampshire

Associate Editors

FRANCIS H. ALLEN, 215 LaGrange St., West Roxbury, Massachusetts.
JOHN T. NICHOLS, American Museum of Natural History, 77th St. and Central Park West, New York City
PROF. J. W. STACK, Michigan State College, East Lansing, Michigan
WINSOR M. TYLER, M.D., Brimmer Chambers, Brimmer St., Boston, Massachusetts.

OFFICERS OF THE THREE BIRD-BANDING ASSOCIATIONS

Northeastern

LAURENCE B. FLETCHER, *President*
S. PRENTISS BALDWIN, *Honorary President*
Vice-Presidents: FRANCIS BEACH WHITE, New Hampshire; HARRISON F. LEWIS, Eastern Canada; DONALD McMILLAN, Massachusetts and Labrador; HENRY S. SHAW, New Hampshire; FRANCIS H. ALLEN, Massachusetts; CHARLES L. WHITTLE, New Hampshire
MRS. ALICE B. HARRINGTON, *Recording Secretary*
CHARLES B. FLOYD, *Secretary and Treasurer*, 95 South St., Boston, Massachusetts

Eastern

JOHN T. NICHOLS, *President*
S. PRENTISS BALDWIN, *Honorary President*
JOHN A. GILLESPIE, *Vice-President*
T. DONALD CARTER, *Secretary*, American Museum of Natural History, 77th St. and Central Park West, New York City
WARREN F. EATON, *Treasurer*

Inland

WILLIAM I. LYON, *President*
S. PRENTISS BALDWIN, *Honorary President*
Vice-Presidents: CLARENCE BRETSCH; FRANK W. COMMONS
M. J. MAGEE, *Treasurer*
J. W. STACK, *Secretary*, Michigan State College, East Lansing, Michigan
HERBERT L. STODDARD, *Field Secretary*

All articles and notes should be submitted to the editor. Manuscripts should be double-spaced and written on only one side of the paper. It is desirable that they reach the editor by the first of the month preceding the month of publication.

Subscription price, $1.50 per year. Single number, 50 cents. Subscriptions should be sent to Charles B. Floyd, 95 South Street, Boston, Massachusetts.

Applications for membership in any of the three Associations should be sent to their respective secretaries. The annual membership dues are $2.00 per year in the Northeastern and Eastern Associations, and $2.50 in the Inland Association. Each members receives *Bird-Banding* free.

Publications for review should be sent to Dr. John B. May, 136 State House, Boston, Massachusetts.

Bound reprints of articles may be had at nominal prices. Fifty copies of four to six printed pages cost about five dollars. Reprints should be ordered early by writing to the editor, preferably when manuscripts are submitted for publication. Any number may be ordered.